

MINERALOGICAL ABSTRACTS

(Vol. 4, No. 2, June, 1929.)

Bibliographies.

Catalogue of scientific papers. Fourth series (1884-1900). Compiled by the Royal Society of London. Cambridge (University Press), 1925, vol. 19 (T-Z), iv + 877 pp. Price £8 8s.

This volume completes a great work of reference in which are listed under authors practically all original papers published in scientific journals during the nineteenth century. Vol. 1 of the first series (for the period 1800-63) appeared in 1867. The seven volumes of the fourth series (1884-1900) give 384,478 titles under 68,577 authors. A rough estimate for the preceding twelve volumes (1800-83) shows 360,000 titles, a grand total for the whole series of nearly three-quarters of a million. Since 1900 the work of cataloguing was carried on, up to 1914, by the International Catalogue of Scientific Literature [M.A. 1-81], but here the author-index was divided up amongst seventeen annual volumes according to subjects. L. J. S.

A world list of scientific periodicals published in the years 1900-21. London (Oxford University Press), 1925, vol. 1, xii + 499 pp.; 1927, vol. 2, xii + 344 pp. Price £3 10s.

A list of 24,029 periodical publications, giving the main title and place of publication, but without any further information. Many weekly trade journals and hobby magazines are included. The second volume gives abbreviated titles, under the same numbering, with indications of the principal libraries in the British Isles where each (but far from all) is kept. L. J. S.

BULTINGAIRE (Léon), sous la direction de Alfred LACROIX. *Inventaire des périodiques scientifiques des bibliothèques de Paris.* Acad. des Sci. de l'Institut de France, Paris (Masson et Cie), 1924-1925, fascicules I-IV, xv + 1102 pp. Price 80 fr.

An alphabetical list of 15,526 (+) periodicals, giving the full title, date of commencement, place of publication, and size of each. The location of the sets, or part sets as indicated by dates, of each periodical is stated for 118 libraries in Paris. Fasc. IV gives geographical and subject indexes. L. J. S.

The aslib directory. A guide to sources of specialized information in Great Britain and Ireland. Edited by G. F. BARWICK. London (Association of Special Libraries and Information Bureaux; Oxford University Press), 1928, xiii + 425 pp. Price 21s.

Under an alphabetical arrangement of a varied and wide range of subjects, particulars are given respecting special libraries, periodicals, societies, &c. It tells at once where is housed the best collection of books on any particular subject. An alphabetical list of towns mentions the libraries in each.

L. J. S.

SPENCER (L. J.). *Données numériques de cristallographie et de minéralogie.* Paris (Gauthier-Villars et Cie) & New York (McGraw-Hill Book Co.), 1928, extrait du vol. 6 (for 1923-24), Tables annuelles de constantes et données numériques, viii pp. + pp. 1226-1278. Price 34 fr. (bound, 50 fr.). [Cf. M.A. 2-97, 3-229.]

SPENCER (L. J.). *The Mineralogical Magazine and Journal of the Mineralogical Society. General Index to vols. XI-XX (1895-1925).* London, 1926, iv + 115 pp. Price 6s.

A topographical index is followed by a detailed alphabetical index of authors, subjects, and localities. There are included 1506 mineral names that have appeared in the literature since the publication, in 1892, of the sixth edition of Dana's 'System of Mineralogy'.

HUNT (Walter F.). *The American Mineralogist. Journal of the Mineralogical Society of America. Decennial Index of authors and subjects—volumes I-X (1916-1925).* Menasha, Wisconsin, [1927], 36 pp. [Price 50 cents.]

This is a short 'working-index' to the principal contents of the ten volumes. In the author-index modified titles of papers are given, and there is some confusion in the case of joint authors. The subject-index is incomplete: matters mentioned in the titles of papers are indexed, but not in all cases the head-lines and text. Localities are included in the alphabetical arrangement under such headings as Africa, Arizona, Australia, England, Iceland: under the last the entry 'Iceland spar in Montana'. New minerals are fully indexed.

L. J. S.

NICKLES (John M.). *Economic Geology, General Index, volumes I-XX, 1905-1925.* The Economic Geology Publishing Company [New Haven, Connecticut], 1926, 337 pp. Price \$3.00.

This is a detailed index of authors, subjects, and localities in one alphabetical arrangement.

NICKLES (John M.). *Bibliography of North American geology for 1923-1924.* Bull. U.S. Geol. Survey, 1927, no. 784, 280 pp.

— for 1925 and 1926. Ibid., 1928, no. 802, 286 pp. Price 40 cents.

The author-catalogues, containing 2577 and 2927 titles respectively in these two issues, are followed by detailed subject-indexes. Canada, Mexico, &c., and the subjects mineralogy, crystallography, and petrology are included. [M.A. 2-480.]

L. J. S.

HALL (A. L.). *A bibliography of South African geology for the years 1921 to 1925 (inclusive). Authors' index.* Mem. Geol. Survey South Africa, 1927, no. 25, 111 pp. Price 5s.

This continuation [M.A. 2-99, 2-481] gives titles numbered 6398-7991 arranged under authors.

Geological literature added to the Geological Society's Library during the year ended December 31st, 1926. [No. 29.] London (Geol. Soc.), 1927, iii + 233 pp. Price 10s.

— year . . . 1927. [No. 30.] London, 1928, iii + 233 pp. Price 10s. Author- and subject-indexes are given. [M.A. 3-230.]

Wykaz prac polskich treści krystalograficznej, mineralogicznej i petrograficznej ogłoszonych w latach 1925-1927.—Table des travaux cristallographiques, minéralogiques et pétrographiques polonais publiés en 1925-1927. Arch. Min. Tow. Nauk. Warszaw (Arch. Min. Soc. Sci. Varsovie), 1928, vol. 2 (for 1926), pp. 93-101.

Titles of papers listed under authors for each year.

KITTL (Erwin). *Bibliografía minera y geológica de Bolivia.* Revista Minera de Bolivia, Oruro, 1928, vol. 3, pp. 12-28, 33-43.

A list of 285 titles, with Spanish translations, of papers and books dealing with the minerals, mining, and geology of Bolivia, arranged alphabetically according to authors.

L. J. S.

DOTY (Marion Foster). *Selenium, a list of references 1817-1925.* The New York Public Library, 1927, iii + 114 pp. Price 65 cents.

[Reprinted from Bull. New York Public Library, 1926.]

This is a very detailed bibliography of selenium arranged under various headings, one of which is 'Mineralogy and Crystallography'. All the works quoted are to be seen in the Reference Library.

L. J. S.

LINDGREN (Waldemar). *Bibliographies, annotated bibliographies and geological abstracts.* Econ. Geol., 1928, vol. 23, pp. 564-568.

An annotated bibliography of economic geology is projected.

Bibliografia del petroleo en Mexico. Monografias Bibliograficas Mexicanas, no. 8, Mexico (Departamento del Petroleo), 1927, viii + 169 pp.

HOLLAND (Sir Thomas H.). *Indian geological terminology.* Mem. Geol. Survey India, 1926, vol. 51, pp. i-ii, 1-184, i-xx, 1 map. Price Rs. 2 As. 8 (4s. 6d.).

A glossary of terms, mainly of geological formations, but including some names of minerals and rocks. An index of authors contains some biographical details. This second edition has been considerably revised and enlarged since the first edition of 1913. L. J. S.

Mathematical Crystallography.

NIGGLI (Paul). *Die topologische Strukturanalyse I.* Zeits. Krist., 1927, vol. 65, pp. 391-415, 12 figs. —— *II.* Ibid., 1928, vol. 68, pp. 404-466, 55 figs.

The author develops a geometrical theory of structure closely akin to that of Weissenburg [M.A. 3-16]. Having defined the different viewpoints of the two theories, he proceeds from a knowledge of the space-group and the size of the unit parallelepiped in any given case to define the limits within which equivalent particles (gleichwertige Teilchen), with respect to a given symmetry group, have a smaller distance from one another than from the other equivalent points. The relations of the positions of the particles to one another are thus worked out and illustrated with diagrams. A systematic study of the 230 space-groups is proceeded with on these lines. (The work is not yet concluded.) F. A. B.

BRANDENBERGER (E.) & NIGGLI (P.). *Die systematische Darstellung der kristallstrukturell wichtigen Auswahlregeln.* Zeits. Krist., 1928, vol. 68, pp. 301-329.

BRANDENBERGER (E.). *Systematische Darstellung der kristallstrukturell wichtigen Auswahlregeln trikliner, monokliner und rhombischer Raumsysteme.* Zeits. Krist., 1928, vol. 68, pp. 330-362.

The first of these papers is founded on the theory of structure-vectors and is a systematic and exhaustive description of important selection properties of a space-group for the determination of crystal-structure. The second paper is an application of these general selection rules for the triclinic, monoclinic, and orthorhombic space-groups. F. A. B.

RINNE (Friedrich). *Zur Nomenklatur der 32 Kristallklassen.* Abhand. Math.-Physis. Kl. Sächs. Akad. Wiss. Leipzig, 1929, vol. 40, no. 5, pp. 1-8.

SCHIEBOLD (Ernst). *Über eine neue Herleitung und Nomenklatur der 230 kristallographischen Raumgruppen.* Ibid., pp. 9-204, 1 pl. *Mit Atlas der 230 Raumgruppen-Projektionen.* Ibid., 22 pp., 46 pls. Price, Text 13 Mk., Atlas 13 Mk.

Abstracts of the short note by Rinne on the 32 crystal-classes and of the elaborate memoir by Schiebold on the 230 space-groups have already appeared [M.A. 3-415-6]. Full details are now given with useful tables for reference and diagrams (some in colour) representing each of the 230 space-groups.

L. J. S.

NIGGLI (Paul). *Über die Wahl der Nullpunkte bei der Charakterisierung deformierter Gitterkomplexe.* Zeits. Krist., 1928, vol. 67, pp. 361-362.

A note on the choice of origin which gives the simplest values for the co-ordinates of equivalent points in a crystalline structure.

H. H.

HERMANN (C.). *Zur systematischen Strukturtheorie. I. Eine neue Raumgruppensymbolik.* Zeits. Krist., 1928, vol. 68, pp. 257-287.

A new notation for the 230 space-groups is suggested. The symbols for the crystal-classes are practically those of Schoenflies, but the arbitrary number of each space-group in its class is replaced by symbols which indicate the nature of the symmetry. For instance, Schoenflies D_{3h}^2 and O_h^{10} become respectively $D_{3h}c\mu\gamma$ and $O_hia\beta\delta$. Here $\alpha, \beta, \gamma, \delta$ denote symmetry-planes in certain given positions, and c, i imply the existence of certain translations.

H. H.

ITO (Teiichi). *Der Diamantgitterkomplex im rhombischen System.* Zeits. Krist., 1928, vol. 67, pp. 341-360, 4 figs.

A discussion is given of the number of orthorhombic space-groups that have lattice-points corresponding to the deformation of the diamond type of lattice. It is on the lines of a similar investigation by P. Niggli, dealing with the deformation of the closest-packed hexagonal type [M.A. 3-415].

H. H.

ERNST (E.). *Die geometrische Bedingung für die Entstehung von Kombinationen.* Zeits. Krist., 1928, vol. 69, pp. 194-210, 2 figs.

Formulae are given for finding the limits between which the ratio of the rates of growth of any two crystal forms must lie, in order that

a crystal may be possible whose boundary is composed of these forms. H. H.

BECKE (Friedrich). *Inversionsachse und Spiegelachse.* Neues Jahrb. Min., Abt. A, 1928, vol. 57, pp. 173-202, 13 figs.

An essay on the geometrical genesis of the 32 crystal-classes and their division into systems by means of axes of rotatory-reflection or rotatory-inversion. [Cf. M.A. 3-414.] H. H.

ROGERS (Austin F.). *A tabulation of the 32 crystal classes.* Amer. Min., 1928, vol. 13, pp. 571-577, 1 pl.

The names adopted for the classes are those of Groth, but his numbering is slightly altered to bring the trigonal dipyramidal and ditrigonal dipyramidal classes into the hexagonal subsystem. The elements of symmetry and the Schoenflies symbols are also tabulated.

L. J. S.

WHERRY (Edgar T.). *Arrangement of the symmetry-classes.* Amer. Min., 1928, vol. 13, pp. 198-199.

The three main divisions correspond to those of optical symmetry, and analogous classes appear in the same columns. [Cf. M.A. 3-418.]

Trigometric division (triclinic, monoclinic, and rhombic).

| | | | | | | |
|--|---|---|--------------|---|---|----------|
| $\text{CaS}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$ | — | — | — | — | — | Chalcan- |
| — | — | $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ | Clinohedrite | — | — | thite |
| — | — | Epsomite | Hemi- | — | — | Gypsum |
| | | | morphite | | | Baryte |

Dimetric division (tetragonal and hexagonal).

| | | | | | | | |
|------|---|-----------|---|---------------------------------------|---|-----------|---|
| 2f | — | Meliphane | — | — | — | Chalco- | — |
| 4f | Wulfenite | Scheelite | $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ | $\text{AgF} \cdot \text{H}_2\text{O}$ | — | pyrite | — |
| 3f | $\text{NaIO}_3 \cdot 3\text{H}_2\text{O}$ | — | Quartz | Tourmaline | — | Anatase | — |
| 3'f | — | (unknown) | — | — | — | Benitoite | — |
| 3''f | — | Dolomite | — | — | — | Calcite | — |
| 6f | Nepheline | Apatite | β -Quartz | Iodrite | — | Beryl | — |

Monometric division (cubic).

| | | | | | |
|------------|--------|---------|--------|---|----------|
| Ullmannite | Pyrite | Cuprite | Blende | — | Fluorite |
| | | | | | L. J. S. |

BARKER (T. V.). *Two-circle calculations.* Festschrift Victor Goldschmidt, Heidelberg, 1928, pp. 25-32, 7 figs.

When a crystal is measured on a two-circle goniometer with one face parallel to the plane of the vertical circle, the cotangents of the angles between one zone also through the face and three other zones

through it, or the cotangents of the angles between this face and any other three faces in such a zone, are connected by a homogeneous linear relation. Owing to the law of rational indices the coefficients in this relation are small integers which are obvious from a gnomonic projection. When they are known the linear relation can be used to combine the observed positions of the various faces in such a way as to obtain the greatest degree of accuracy, instead of relying on a few faces as fundamental and practically ignoring the rest. The method suggested is illustrated by a discussion of the measurements of a crystal of rubidium tetroxalate.

H. H.

GIANNOTTI (Carlo). *Il tracciamento degli assi nel disegno ortografico dei cristalli per mezzo dei nomogrammi.* Atti (Mem.) Soc. Toscana Sci. Nat., 1926, vol. 37, pp. 100-127, 2 pls., 4 text-figs.

A description of the application of nomograms for plotting the co-ordinate axes for crystal-drawings. Considerable arithmetical labour is thereby avoided in the calculation of the requisite formulae. [The trigonometrical scales of the slide-rule would serve the same purpose.]

F. A. B.

HERLINGER (E.). *Über eine Vorrichtung zur Herstellung von stereographischen Netzen.* Zeits. Krist., 1928, vol. 67, pp. 543-546, 4 figs.

The author gives a suggestion for the practical construction of a stereographic net, depending on the fact that all angles in the same segment of a circle are equal.

H. H.

Crystal-optics.

SCHMIDT (Walter) & BAIER (Ernst). *Versuche über die Kinetik der Änderung optischer Eigenschaften mit der Temperatur.* Zeits. Krist., 1928, vol. 68, pp. 477-502, 19 figs.

The birefringence of beryl and orthoclase at temperatures between 0° and 1100° C. was measured by observing the interference fringes in parallel light when a plate of the substance is placed between crossed nicols. Beryl experiences a permanent alteration of the birefringence when heated, a fact which appears to be connected with a change of colour from yellow to greenish-blue. For orthoclase was observed a hysteresis effect in $\beta - \alpha$, but no lasting change after heating to 1100° C. and subsequent cooling to room temperature. On the other hand $\gamma - \alpha$ does not return completely to its original value when the crystal cools; and there are distinctions between

the behaviour of adularia and sanidine in this respect not observable in the measurements of $\beta - \alpha$. The difference in behaviour between $\gamma - \alpha$ and $\beta - \alpha$ is ascribed to the mimetic twinning of orthoclase on (010). H. H.

TERPSTRA (P.). *Notiz zur Konstruktion der Schwingungsellipse des aus einer doppelbrechenden Kristallplatte austretenden, elliptisch polarisierten Lichtes.* Zeits. Krist., 1928, vol. 68, pp. 152-154, 3 figs.

Light polarized in a given plane is supposed to pass through a thin crystalline plate, and the extinction-directions of the plate and the phase-difference it produces are supposed known. A geometrical construction is then given for finding the magnitude and direction of the axes of the ellipse of the emerging elliptically polarized light.

H. H.

COODE-ADAMS (W. R. C.). *The refractive index of quartz.* Proc. Roy. Soc. London, Ser. A, 1927, vol. 117, pp. 209-213.

A new formula for the refractive index of quartz has been arrived at by making use of the ultra-violet frequencies calculated from the recently determined optical rotatory powers [M.A. 4-56]. $n^2 = 3.53445 + 0.008067/(\lambda^2 - 0.0127493) + 0.002682/(\lambda^2 - 0.000974) + 127.2/(\lambda^2 - 108)$. The formula fits experimental data for the visible, ultra-violet, and infra-red regions with an accuracy hitherto unattained. The constant term, 3.53445, should equal the specific inductive capacity of quartz; quite close experimental values are quoted.

F. A. B.

COODE[-]ADAMS (W. R. C.). *The refractive index of quartz.* Proc. Roy. Soc. London, Ser. A, 1928, vol. 121, pp. 476-477.

An equation connecting the refractive index and the wave-length for the extraordinary ray in quartz is developed in the same way as for the ordinary ray (see previous abstract). Refractive indices, calculated by means of this equation are compared with observed values for eighteen lines in the visible and ultra-violet. F. A. B.

LOWRY (Thomas Martin) & COODE-ADAMS (W. R. C.). *Optical rotatory dispersion. Part III.—The rotatory dispersion of quartz in the infra-red, visible and ultra-violet regions of the spectrum.* Phil. Trans. Roy. Soc. London, Ser. A, 1927, vol. 226, pp. 391-466, 2 pls., 1 text-fig.

A long series of careful determinations was made with a cylinder

of laevogyral quartz about 50 cm. long for wave-lengths 2517 to 226.3 $\mu\mu$ at 20° C. Observed rotations range from 0.906° to 202.328° per mm.; for the two sodium lines they are 21.7010° and 21.7492°.

L. J. S.

BRADSHAW (T.) & LIVENS (G. H.). *The formula for the optical rotatory dispersion of quartz.* Proc. Roy. Soc. London, Ser. A, 1929, vol. 122, pp. 245-250.

A modification of the empirical formula of Lowry and Coode-Adams (preceding abstract) for expressing the relation between the angle of rotation and the wave-length. L. J. S.

HARRIS (F. C.). *The dispersion of double refraction in quartz.* Phil. Mag., 1929, ser. 7, vol. 7, pp. 80-85, 1 plate.

A parallel beam of white light incident on a plate of quartz at right angles to its optic axis was focused on the slit of a Littrow spectrograph. The quartz plate was interposed between crossed nicols. The wave-lengths of the bands thus produced were measured by means of a comparison spectrum of the iron arc. The order of each band was obtained by rotating the plate about its optic axis and bringing the bands in turn into coincidence with the sodium lines. These observations yield fifty-seven values over the whole of the visible spectrum for the double refraction in quartz. The almost complete agreement between present and previous values shows that the law of dispersion of double refraction is sensibly identical in different specimens of quartz.

F. A. B.

STAMM (P.). *Die Absorption des sichtbaren und ultravioletten Lichtes und die Interferenz der Röntgenstrahlen beim Turmalin.* Neues Jahrb. Min., Abt. A, 1926, vol. 54, pp. 293-319, 4 plates, 7 text-figs.

The absorption of visible and ultra-violet light in tourmaline crystals from various localities is considerably different in the two directions, parallel and perpendicular to the base. With the exception of rubellite, all the crystals absorb completely the ultra-violet end of the spectrum; a rise in temperature is generally accompanied by weaker absorption. Laue-photographs of tourmaline are reproduced, and it is found that a crystal exposed to radiation from radium for twenty-five days gives a Laue-picture with only the primary spot present (molybdenum anticathode). F. A. B.

RINNE (F.). *Notiz zur Veröffentlichung von P. Stamm über die Lichtabsorption und die Interferenz der Röntgenstrahlung beim Turmalin.* Centr. Min., Abt. A, 1927, pp. 217-218. (See above abstract.)

The author exposed a tourmaline crystal to radiation from radium for forty days and obtained a complete Laue-picture (tungsten anticathode). F. A. B.

HAASE (Max). *Optische Untersuchung der Kupferhalogenide.* Zeits. Krist., 1928, vol. 68, pp. 82-86, 1 fig.

Determinations of the refractive indices for various wave-lengths were made by the immersion method on the same samples of material on which the lattice constants had been determined [M.A. 3-179]. The values for sodium-light are: CuCl 1.973, CuBr 2.116, CuI 2.345.

L. J. S.

WOYNO (Tadeusz Jerzy). *Dwójlomność jako kryterium znaku optycznego kryształów dwuosiowych.—The birefringence as a criterion of the sign of the double refraction of biaxial crystals.* Arch. Min. Tow. Nauk. Warszaw. (Arch. Min. Soc. Sci. Varsovie), 1928, vol. 3 (for 1927), pp. 119-126 (Polish), 127-128 (English summary).

WOYNO (T. J.). *Doppelbrechung als Kriterium für das optische Vorzeichen zweiachsiger Kristalle.* Zeits. Krist., 1928, vol. 67, pp. 559-562.

The usual approximate rule is that a crystal is positive or negative according as $\gamma - \beta$ is greater or less than $\beta - \alpha$, where α , β , γ are the principal refractive indices. Some minerals are considered in which it is necessary to use the exact rule that the crystal is positive or negative according as $(\gamma^2 - \beta^2)\alpha^2$ is greater or less than $(\beta^2 - \alpha^2)\gamma^2$.

H. H.

EMMONS (R. C.). *The double dispersion method of mineral determination.* (Preliminary paper.) Amer. Min., 1928, vol. 13, pp. 504-515, 5 figs.

A further extension of the method of determining the refractive indices of mineral fragments immersed in liquids [M.A. 3-323, 4-4]. Hot water circulates through a cell on the microscope stage and on the refractometer. A monochromator is also used, so that with two variations ('double dispersion') in the liquid a greater range of refractive index is available for comparison. The thirteen

liquids employed range from methylene iodide (n_D 1.742 at 24° C.) to ethyl monochloracetate (n_D 1.420 at 24° C.). Graphs showing the dispersion of these liquids are added.

L. J. S.

Physical Properties of Crystals.

WILSON (Ernest) & HERROUN (E. F.). *The magnetic properties of varieties of magnetite.* Proc. Physic. Soc. London, 1919, vol. 31, pp. 299–318, 2 figs.

The magnetic properties of bars cut from crystals of magnetite and rocks rich in magnetite have been studied both before and after heat treatment. The susceptibility and magnetizing force curves resemble those for iron; values of the retentivity, coercive force, energy dissipation, density, &c., are tabulated. Increase in susceptibility of certain specimens by heat treatment is sometimes to be attributed to the conversion of ferrous carbonate and ferric oxide into magnetite. Experiments bearing on the intensity of magnetization in the natural state are also described.

F. A. B.

WILSON (Ernest). *The measurement of magnetic susceptibilities of low order.* Proc. Roy. Soc. London, Ser. A, 1920, vol. 96, pp. 429–455, 2 figs.

An instrument is described in which the pull of an electromagnet on a specimen is balanced against the force of torsion in a phosphor-bronze strip. The volume-susceptibility of many specimens is measured by its aid. Many micas were also tested and the susceptibility in directions parallel to the laminae was found to be about fifty times that in directions at right angles to the laminae. Some tourmalines were also studied: the darker varieties exhibit a susceptibility parallel to the optic axis about 16–20 % less than that perpendicular thereto. The author finds that the relative amounts of ferrous iron in glasses can be determined by this method.

F. A. B.

WILSON (Ernest). *On the measurement of small susceptibilities by a portable instrument.* Proc. Physic. Soc. London, 1919, vol. 31, pp. 338–346, 2 figs.

The instrument described in the preceding abstract has been made portable by substituting a permanent magnet for an electromagnet; the field is varied by means of rotating ring magnets. Volume-

susceptibilities from 0.15 to 0.000015 can be measured, a range suitable for most magnetic survey work.

F. A. B.

HERROUN (E. F.) & WILSON (E.). *On the magnetic susceptibility of certain natural and artificial oxides.* Proc. Physic. Soc. London, 1921, vol. 33, pp. 196-205.

The susceptibility of naturally occurring ferric oxides is found to vary considerably, but the value for the artificial product varies still more. It appears that the passage through the stage of magnetic oxide impresses more pronounced magnetic properties upon the resulting ferric oxide. Compounds of the type $MO.Fe_2O_3$ (ferrites) have been studied and are found to have higher susceptibilities than ferric oxide, whereas aluminates, formed by replacement of ferric oxide by alumina, show no definite increase in susceptibility. The densities and mass susceptibilities of many natural oxides are tabulated.

F. A. B.

HUGGETT (J.) & CHAUDRON (G.). *Étude thermomagnétique de quelques minéraux de fer.* Compt. Rend. Acad. Sci. Paris, 1928, vol. 186, pp. 694-696, 1 fig.

Curves are given showing the variation of susceptibility with temperature up to 700° C. for magnetite, ferric oxide, martite, goethite, and lepidocrocite.

F. A. B.

HERROUN (E. F.) & WILSON (E.). *Ferromagnetic ferric oxide.* Proc. Physic. Soc. London, 1928, vol. 41, pp. 100-111, 1 fig.

Lepidocrocite, but not goethite, yields on dehydration a strongly ferromagnetic ferric oxide, a result in agreement with previous work [M.A. 3-217]. The mode of preparation affects the temperature at which the ferromagnetic oxide is transformed permanently into the paramagnetic form. It is suggested that manganese oxide may be an essential constituent of crystalline lepidocrocite, but the properties of artificial $MnO.Fe_2O_3$ do not account for the magnetic behaviour of this mineral. The results of various magnetic measurements are tabulated, together with the density, for different kinds of magnetic ferric oxide, for compressed bars of magnesium and copper ferrites, and for natural magnetite. Chemical analyses of five magnetites from various localities are given; the susceptibilities of the ferric oxide resulting from their oxidation depends on the amount of impurity present, particularly magnesium oxide, which forms a magnetic ferrite during oxidation.

F. A. B.

MCLENNAN (J. C.), RUEDY (R.), & COHEN (Elizabeth). *The magnetic susceptibility of single crystals of zinc and cadmium.* Proc. Roy. Soc. London, Ser. A, 1928, vol. 121, pp. 9-21, 7 figs.

The method of preparing single crystals of zinc and cadmium is described in detail. The crystals were rotated about a vertical axis in a uniform field and the susceptibility measured for different orientations. This was done for field strengths from 8,500 to 11,600 gauss. A correction was applied for the iron content, and the specific (or mass) susceptibilities were deduced for directions parallel and perpendicular to the hexagonal axis respectively.

$$\begin{array}{llll} \text{Cadmium} & \dots & \dots & \chi_{(111)} = 190 \cdot 10^{-6}, \quad \chi_{(\perp)} = 145 \cdot 10^{-6} \\ \text{Zinc} & \dots & \dots & \chi_{(111)} = 261 \cdot 10^{-6}, \quad \chi_{(\perp)} = 160 \cdot 10^{-6} \end{array}$$

The authors consider that their results for solid mercury support the view that this metal crystallizes in the rhombohedral system.

F. A. B.

GRIFFITHS (Ezer). *The thermal and electrical conductivity of a single crystal of aluminium.* Proc. Roy. Soc. London, Ser. A, 1927, vol. 115, pp. 236-241, 4 figs.

Along a direction inclined at 114.3° , 80.7° , and 25.6° to the three co-ordinate axes (determined by means of X-rays) the values are: for the thermal conductivity $K = 0.551$ (at 98.1°C.) to 0.557 (at 215.2°C.); specific electrical resistance 2.89×10^{-6} ohms per c.c. at 18°C.

L. J. S.

KANNULUIK (W. G.) & LABY (T. H.). *The thermal and electrical conductivity of a copper crystal at various temperatures.* Proc. Roy. Soc. London, Ser. A, 1928, vol. 121, pp. 640-653, 3 figs.

The thermal conductivity of an artificial crystal is determined by a thermal method in high vacuum, a correction being applied for the lateral heat losses at room-temperature. The determinations at low temperatures give results less than those of previous workers, but at 19.4°C. the thermal conductivity is about 4 % greater than that of polycrystal copper, a result in agreement with earlier work. The electrical conductivity is the same as that of polycrystal copper. Values of the Wiedemann-Franz constant are given for 90.2° and 273.2° absolute.

F. A. B.

HARVEY (Roger D.). *Electrical conductivity and polished mineral surfaces.* Econ. Geol., 1928, vol. 23, pp. 778-803, 7 figs.

Instruments are described which measure the resistance between

platinum-iridium points pressed into contact with a polished mineral surface mounted on a microscope stage. A four-point tester is associated with a potentiometer and a two-point tester with a Wheatstone bridge; the former gives results independent of contact resistance. The distance between points is kept constant in both instruments, 0.41 and 0.085 mm. respectively. About 2,000 relative resistances were measured for a wide range of specimens with both instruments. Readings for any one mineral species are not constant and vary considerably with the poorer conductors. In spite of overlapping in many cases, it is possible to distinguish certain minerals from one another by such tests, and these minerals are tabulated. [No attempt is made to give the physical significance of these measurements; and no relation with specific conductivity is established.]

F. A. B.

MANDELL (W.). *The determination of the elastic moduli of the piezo-electric crystal Rochelle salt by a statical method.* Proc. Roy. Soc. London, Ser. A, 1927, vol. 116, pp. 623-636, 5 figs.

Six beams, suitably cut from crystals of Rochelle salt, were loaded in the middle and the amount of bending in each case determined by an interference method. The bending experiments are sufficient to determine the surface of elasticity. The absolute values of each of the nine elastic moduli were finally calculated from the results of twisting experiments carried out on three more beams suitably cut. The values show that Young's modulus is much smaller for Rochelle salt than for crystals of aragonite and topaz. No abrupt change in elasticity takes place near the temperature above which Rochelle salt loses its piezo-electric properties. The author also finds that the Cauchy-Poisson relations for the deduced elastic constants do not hold; he infers that there is a strong polar force between the molecules. Lastly, the results for this salt confirm the view that an electrostatic field does exert an influence on light motion in piezo-electric crystals.

F. A. B.

MANDELL (W.). *The change in elastic properties on replacing the potassium atom of Rochelle salt by the ammonium group.* Proc. Roy. Soc. London, Ser. A, 1928, vol. 121, pp. 122-130, 2 figs.

The same experiments were performed for crystals of this salt as for Rochelle salt (see preceding abstract). There is considerable similarity between the elastic curves of the two salts; but small differences appear, especially in the directions where tensions or pressures

give a maximum piezo-electric response. The elastic properties are, however, diminished in all directions; this is a remarkable result for a simple chemical change in so complex a molecule. It would suggest that the potassium atom must be a sort of 'key' atom in the molecule.

F. A. B.

MANDELL (W.). *The determination of the piezo-electric moduli of ammonium Seignette salt.* Proc. Roy. Soc. London, Ser. A, 1928, vol. 121, pp. 130-140, 1 fig.

An account is given of the determination of the three piezo-electric moduli for this salt; the constants are then deduced, using the values of the elastic constants. For pressures in a direction equally inclined to the b and c axes, the polarization along the a axis decreases by about 95 % on substituting the ammonium group for the potassium atom in Rochelle salt, whilst the two other values are only slightly smaller. The signs of the corresponding moduli are the same. Owing to the close relationship between piezo-electric phenomena and optical rotation one would expect, therefore, that the two salts would have the same sign of optical rotation; the ammonium salt, however, is laevorotatory.

F. A. B.

ELINGS (S. B.) & TERPSTRA (P.). *Prüfung einiger Kristallarten auf Piezoelektrizität.* Zeits. Krist., 1928, vol. 67, pp. 279-284, 2 figs.

The apparatus designed by E. Giebe and A. Scheibe (Zeits. Physik, 1925, vol. 33, p. 760) for the detection of piezo-electric phenomena was improved and applied to verify their results and extend their method to forty-one other substances.

H. H.

ELAM (C. F.). *Tensile tests of crystals of an aluminium zinc alloy.* Proc. Roy. Soc. London, Ser. A, 1925, vol. 109, pp. 143-149, 5 figs.

Cubic crystals of aluminium can take up 18 % zinc. The hardness is much increased and the amount of slip that can occur before fracture much reduced. The breaking stress and the type of fracture depend on the orientation of the crystal relative to the axis of the test piece.

L. J. S.

MÜGGE (O.). *Einfache Schiebungen und Translationen an Kristallen des weißen Zinns.* Zeits. Krist., 1927, vol. 65, pp. 603-606, 1 fig.

One end of a thin steel cylinder was placed on the face (110) of a tin crystal, and the other end was struck lightly with a rather heavy hammer. Simple shear was observed in the tin with elements $K_1 =$

(331), $K_2 = (11\bar{1})$ in accordance with Ganten's results, but nothing was seen of the translations recorded by Mark and Polanyi [M.A. 2-334].

H. H.

SEIFERT (H.). *Über Schiebungen am Bleiglanz.* Neues Jahrb. Min., Abt. A, 1928, vol. 57, pp. 665-742, 8 figs.

Twin-laminae of galena were observed with many different twin-planes, of which (441) is by far the commonest, though (113) and many others occur. They may be explained as due to secondary twinning by pressure, probably with simultaneous rise of temperature. The deformation is not readily explained as lattice shearing. The octahedral parting often observed in galena is probably due to a separation along the glide-faces (111).

H. H.

BUERGER (M. J.). *The plastic deformation of ore minerals. A preliminary investigation: galena, sphalerite, chalcopyrite, pyrrhotite and pyrite.* Amer. Min., 1928, vol. 13, pp. 1-17, 35-51, 20 figs.

Single crystals were embedded in fused alum in short pieces of copper tube and subjected to high pressures (e.g. 46,000 lb. for 18 minutes) in various orientated directions. The amount of the plastic deformation was measured and the directions of the striae developed on the polished surfaces were studied. The crystal tends to orientate itself to accommodate this pressure; but a study of the etched surfaces of ores that had evidently been subjected to earth pressures led to negative results. Galena is deformed by translation along cube planes in the direction [110] of a face diagonal. Blende deforms by gliding on the tetrahedral planes, but the movement is that of secondary twinning, not translation. Chalcopyrite deforms by translation on (111), the direction of the translation being [110] as deduced theoretically from a consideration of the atomic arrangement in the lattice. Negative results were obtained with pyrrhotine and pyrite. A hypothesis is advanced according to which pure minerals should deform by translation, whilst solid solution minerals should do so by secondary twinning.

L. J. S.

SYROMJATNIKOFF (F.) [= Сыромятников (Ф. В.) = SYROMYATNIKOV (F. V.)]. *Über einen Versuch, die Zugfestigkeit der Chrysotil-Asbestfasern zu bestimmen.* Zeits. Krist., 1927, vol. 66, pp. 191-194, 1 fig.

The tension which can be sustained by asbestos fibres was found to be about 226 kg/mm² on an average. The cross-section of the fibres was deduced from their length, weight, and density.

H. H.

SCHUBNIKOFF (A.) [= Шубников (А.) = SHUBNIKOV (A.)]. *Über die Bohrfiguren im Glimmer.* Zeits. Krist., 1928, vol. 66, pp. 434-440, 5 figs.

Mica and other brittle materials, such as paper impregnated with sulphur, were pierced with a needle. When the hole was enlarged by an n -edged opening-bit, it assumed the shape of an $(n+1)$ -sided polygon with fluted edges and well-marked corners. A theoretical explanation of the phenomenon is suggested. H. H.

BRIDGMAN (P. W.). *Linear compressibility of fourteen natural crystals.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 483-498, 1 fig.

— *The compressibility of several artificial and natural glasses.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 359-367, 1 fig.

The linear compressibility of cut rods was measured at 30° and 75° C. for pressures up to 12,000 kg/cm², and expressed in the form $\Delta l/l_0 = ap - bp^2$. The minerals used were fluorite, magnetite, cobaltite, galena, pyrite, argentite, blende, tourmaline, rutile, quartz, calcite, celestine, spodumene, crocoite. In the case of non-cubic crystals the rods were cut in definite axial directions, and the cubic compressibility calculated. L. J. S.

ADAMS (Leason H.). *A note on the change of compressibility with pressure.* Journ. Washington Acad. Sci., 1927, vol. 17, pp. 529-533, 1 fig.

A table is given for numerous chemical elements and minerals showing the compressibility and the change of compressibility with 10,000 megabars increase of pressure; omitting some non-cubic substances, for which the 'linear method' of determination may be a source of error. A graph is plotted showing a definite relation between the two quantities, which increase together and are apparently connected by a relation which is independent of the nature of the element. This relation may be used to afford a rough estimate of the change in compressibility due to pressure, if the compressibility itself is known. A. F. H.

BRIDGMAN (P. W.). *The pressure transitions of the rubidium halides.* Zeits. Krist., 1928, vol. 67, pp. 363-376, 10 figs.

Fresh modifications of RbCl, RbBr, RbI exist at high pressures, the pressure in kilos per square centimetre for a temperature of 50° C. at which the transition takes place being about 5525, 4925,

4050 respectively. Attempts to obtain a similar transition-pressure for KBr, &c., gave a negative result. H. H.

GIBSON (R. E.). *The influence of pressure on the high-low inversion of quartz.* Journ. Physical Chem., 1928, vol. 32, pp. 1197-1205, 4 figs.

— *A note on the high-low inversion of quartz and the heat capacity of low quartz at 573°.* Ibid., pp. 1206-1210, 2 figs.

This inversion appears to be truly reversible at 572.3° C., but is usually accompanied by superheating or supercooling. A special furnace is described for pressures up to 15,000 megabars. Under 3,000 mb. the inversion-point is raised to 644° C. The volume-change being taken as 3.25 c.c. per kg., the latent heat of the transformation is calculated at 3.1 cal. per gram. The apparent heat capacity of low quartz must be very high, reaching about 4 calories per gram near the transition point.

A. F. H.

PALACHE (Charles). *The phosphorescence and fluorescence of Franklin minerals.* Amer. Min., 1928, vol. 13, pp. 330-333, 1 fig.

Various minerals from Franklin Furnace, New Jersey, were tested for fluorescence in ultra-violet rays, using a laboratory-made apparatus giving a high-tension electric spark between iron electrodes. The ordinary type of willemite is fluorescent and sometimes also strongly phosphorescent with a green colour; but the white and black willemites do not react. Calcium-larsenite [M.A. 3-469] gives a very vivid lemon-yellow fluorescence more intense than that of willemite. Other minerals that react are calcite (pink to red fluorescence), larsenite (pale violet), pectolite (yellow), clinohedrite (orange-yellow), margarosanite (violet), hardystonite (faint violet), roeblingite (pale pink), hedyphane (bluish grey). The results are, however, variable, and depend on the presence of traces of impurities.

L. J. S.

SPENCER (L. J.). *Fluorescence of minerals in ultra-violet rays.* Nat. Hist. Mag. Brit. Mus., 1928, vol. 1, pp. 291-298; Amer. Min., 1929, vol. 14, pp. 33-37.

A brief, popular account. Some specimens are fluorescent, whereas other specimens of the same mineral-species are not. An attractive public exhibit has been arranged where the change from ordinary lighting to ultra-violet rays is effected by a spring-switch. [See Min. Mag. 21-394.]

L. J. S.

Precious Stones.

CHURCH (Sir A. H.). *Precious stones considered in their scientific and artistic relations. A guide to the Townshend collection.* Victoria and Albert Museum Handbooks, London, 1924, xvi + 164 pp., 5 pls., 9 text-figs. Price 4s. (bound 5s.).

This is a reprint of the 1913 edition [Min. Mag. 17-124]. The coloured plate has been reproduced by the three-colour process.

L. J. S.

KUNZ (George Frederick). *Precious stones.* Mineral Industry, New York & London, 1928, vol. 36 (for 1927), pp. 491-513. [The wrapper of author's reprints bears the title: *The production of precious stones for the year 1927.*]

A continuation of previous annual reports [M.A. 3-436]. The changing conditions of diamond mining in South Africa are noted.

L. J. S.

WHEELER (R. E. Mortimer). *The Cheapside hoard of Elizabethan and Jacobean jewellery.* London Museum Catalogues, no. 2, 1928, 35 pp., 15 pls., 6 text-figs. Price 1s.

An interesting and well-illustrated account of an extensive collection of jewellery found during excavation in 1912 in Cheapside, London. The collection is dated about 1600, and it was probably the stock of a jeweller, as some unmounted stones are included. All the usual gem-stones are represented, and the various forms of cutting include the cabochon-cut, table-cut, trap-cut, rose-cut, and fancy-cut. The coloured plates by the three-colour process give excellent representations of a variety of objects. On one plate is shown a small watch set in a hexagonal slice (3 cm. across) of an emerald crystal, no doubt from Colombia.

L. J. S.

KRAUSS (Ferdinand). *Synthetische Edelsteine.* Berlin (Georg Stilke), 1929, 134 pp., 19 figs. Price 6.50 Mk.

A useful and concise review is given of the results that have been obtained in the artificial production of gem minerals, more particularly diamond and corundum, with 341 references to the literature. The author believes that H. Moissan succeeded in preparing diamond, but that the results of other experimenters are doubtful. L. J. S.

D[ESCH] (C. H.). *The problem of artificial production of diamonds.* Nature, London, 1928, vol. 121, pp. 799-800.

The general problem and the results hitherto obtained are reviewed. It is suggested that the crystals obtained by H. Moissan were spinel, and it is very doubtful if diamond has ever been prepared artificially.

L. J. S.

SESTA (Luciano). *Concerning the artificial preparation of diamonds.*

Phil. Mag., 1929, ser. 7, vol. 7, pp. 488-493, 1 pl.

Recapitulates the results obtained by M. La Rosa in 1909-10 on the melting and rapid crystallization of carbon. Using an intense intermittent electric arc he obtained from sugar-charcoal spherical particles and minute tetrahedra with curved faces, with sp. gr. > 3:2, H. > 9, which burnt in oxygen leaving no residue. L. J. S.

DRAPER (David). *On the occurrence of diamonds associated with the chert beds of the dolomite series in the districts of Ventersdorp and Lichtenburg.* Trans. Geol. Soc. South Africa, 1928, vol. 30 (for 1927), pp. 57-67, 1 fig.

HARGER (H. S.). *Discussion of the above paper.* Proc. Geol. Soc. South Africa, 1928, vol. 30 (for 1927), pp. xxxix-xliv, 1 fig.

Diamonds have been found over an area of some 1,500 square miles in the districts named in the Transvaal. The country is flat, with many swallow-holes into the underlying dolomite formation, and there are no modern stream channels on the surface. The upper beds of the dolomite series consist largely of laminated chert and chert breccia, among which the diamonds are found. There are no reliable surface indications of the presence of diamonds, but the richest deposits are found in proximity to irregular ridges of chert. Draper considers that the diamonds were deposited on the sea-floor, as the dolomite sea shallowed, and before the Pretoria beds were laid down; the diamonds being derived from pre-Cambrian rocks. The chert ridges are regarded as storm beaches. Harger disagrees with this view, and shows that the chert ridges represent the infilling of ancient stream channels. Silicified wood and even stone implements of Mousterian type have been found in the diamondiferous gravels, indicating a Tertiary to Pleistocene age for the latter. Harger thinks that the diamonds probably originated in kimberlite pipes which still await discovery.

S. J. S.

POINDEXTER (O. F.). *Constituents of diamond-bearing black sands from Angola, Portuguese West Africa.* Amer. Min., 1928, vol. 13, pp. 236-237.

From a 20lb. sample collected several years ago from various rivers twenty-one small diamonds were picked out. The most abundant constituent is a black glassy mineral which is compared with 'obsidianoid augite'. Other minerals present include quartz, garnet, kyanite, diallage, corundum, rutile, ilmenite, &c. L. J. S.

WAGNER (Percy A.) & MERENSKY (Hans). *The diamond deposits on the coast of Little Namaqualand.* Trans. Geol. Soc. South Africa, 1929, vol. 31 (for 1928), pp. 1-35, 9 pls., 5 text-figs. [Preprints issued in 1928.]

The newest diamond field of South Africa stretches along the arid coast of Little Namaqualand, between the Orange river and the Groen river, a distance of 180 miles. The deposits are rich but patchy, and the diamonds are generally deeply buried beneath sand, surface limestone, and barren gravels. There has been a geologically recent uplift of the coast, giving a series of three or four shingle-covered terraces, of which the lowest has an elevation of 25-60 feet above present sea-level. The diamond deposits are of three main types: (1) Raised beaches; (2) River terraces; (3) Deflation residue, derived from the destruction of the raised beaches. The first type is by far the richest, and the diamonds found in the older beaches are bigger and of better quality than those found in the younger beaches. The deposits of the 'Oyster Horizon' at Alexander Bay, just south of the Orange river, form a layer of shingle up to forty feet wide, resting on a wave-cut shelf which seems to have acted as a natural riffle, causing a great concentration of diamonds. Among the boulders are jaspers derived from the rocks of Griqualand West, but the characteristic minerals of the kimberlite pipes are not found in the wash. The content of diamonds ranges from three to over a hundred carats per load; the average size of the stones is two carats, and the quality is such that the Alexander Bay diamonds are likely to set a new standard in the diamond trade. The biggest stone yet found weighed eighty-five carats and fetched £60 per carat. At the mouth of the Buffels river, diamonds have been found at four distinct levels, and stones to the value of £240,000 have already been produced from this field. As regards the source of the Namaqualand diamonds, it is clear that many of those found at Alexander Bay were carried

down by the Orange river from Griqualand West, but it is unlikely that those found about the Kamma, Buffels, and Groen rivers were derived from this source. Alternative possibilities are either a number of unknown sources in the interior of Namaqualand or else a source beneath the Atlantic.

S. J. S.

THOMPSON (Lester S.). *The upland diamond deposits of the Diamantina district, Minas Geraes, Brazil.* Econ. Geol., 1928, vol. 23, pp. 705-723, 6 figs.

Besides being found in the recent alluvial deposits, diamonds are also found in the basal conglomerate of the Caraça quartzite (Algonkian?) resting on the crystalline schists of the basement complex. They are also found in breccias, which occur as large elliptical patches extending to unknown depths in the quartzites. These breccias consist of blocks of quartzite and schist in a light-coloured decomposed matrix containing much magnesia, similar to the material of small dikes in the neighbourhood. From this matrix, and also from the dikes, rutile, anatase, ilmenite, kyanite, tourmaline, monazite, and magnetite were obtained by panning, these minerals being the well-known associates of diamond. It is suggested that these elliptical patches of breccia are analogous to the kimberlite pipes of South Africa. The fact that the breccias are later than the basal conglomerate suggests that the diamonds found in these ancient placers were derived from some earlier source.

L. J. S.

BRACEWELL (Smith). *The Potaro diamond district, British Guiana.* Mining Mag. London, 1928, vol. 38, pp. 267-276, 6 figs. [See M.A. 3-437-8.]

RINNE (Friedrich). *Morphologische und physikalisch-chemische Untersuchungen an synthetischen Spinellen als Beispielen unstoichiometrisch zusammengesetzter Stoffe.* Neues Jahrb. Min., Abt. A, 1928, vol. 58, pp. 43-108, 20 pls., 66 text-figs.

Certain artificial gem spinels [M.A. 3-441-2] contain a large excess of alumina in unstoichiometric proportions over that required by the formula $MgAl_2O_4$. The material possesses many peculiar properties, and it has been studied in detail by all available methods. Each pear-shaped drop is a single crystal and shows rounded faces of the cube, octahedron, and rhombic-dodecahedron, and the silky upper surface shows a minute reticulated crystalline pattern. Usually a cubic axis coincides with the axis of the 'pear', i. e. with the axis of the oxyhydrogen blowpipe in which it was formed, so affording a good

example of thermotaxis [M.A. 3-331]. The 'pears' often show a wavy parting or cleavage parallel to the cube faces, and optical anomalies are also evident. Spheres were etched in fused KHSO_4 ; the first stage in the solution form is a rounded rhombic-dodecahedron and the final form a rounded four-faced cube. The light-figures given by these solution forms are plotted, and many reflectograms [M.A. 3-513-4] are reproduced. X-ray examination by the Laue, rotating crystal, and powder methods shows no essential difference between natural spinel and these artificial spinels of varying composition, and the powder photographs are the same as those given by $\gamma\text{-Al}_2\text{O}_3$. The following table gives a selection of the determined constants:

| Composition. | Sp. gr. | <i>n</i> | | | Edge (<i>a</i>) of unit cube. |
|---|---------|--------------|---------------|-----------------|---------------------------------------|
| | | 623.4 (red). | 578 (yellow). | 435.9 (violet). | |
| $\text{MgO} \cdot \text{Al}_2\text{O}_3$... | 3.577 | 1.7161 | 1.7190 | 1.7322 | 8.02 A. |
| $\text{MgO} \cdot 1.74\text{Al}_2\text{O}_3$ | 3.604 | 1.7214 | 1.7239 | 1.7375 | — |
| $\text{MgO} \cdot 3\text{Al}_2\text{O}_3$... | 3.620 | 1.7246 | 1.7272 | 1.7409 | 7.96 |
| $\text{MgO} \cdot 4\text{Al}_2\text{O}_3$... | 3.625 | 1.7258 | 1.7284 | 1.7421 | 7.92 |
| $\text{MgO} \cdot 5\text{Al}_2\text{O}_3$... | — | 1.7261 | 1.7288 | 1.7428 | 7.91 |

The conclusion arrived at is that the material is a solid solution or mixed crystal of $\alpha\text{-Al}_2\text{O}_3$ in spinel. When the spinels which contain an excess of alumina are tempered for some hours at 800° they become cloudy and show a moonstone schiller and asterism, due as shown with the ultra-microscope to the separation of minute particles. Tempered for longer periods, the stones become opaque; the Lauegrams then show two series of spots, and thin sections under the microscope show a regular network intergrowth of spinel and corundum. This change is accompanied by an increase in density from 3.62 to 3.81, corresponding to the inversion of $\gamma\text{-Al}_2\text{O}_3$ to $\alpha\text{-Al}_2\text{O}_3$ (corundum).

L. J. S.

FARRINGTON (Oliver C.). *Agate—physical properties and origin.* pp. 105-123.

LAUFER (Berthold). *Agate—archaeology and folk-lore.* pp. 124-139. Agate. Field Museum of Natural History, Chicago, 1927, Geology Leaflet 8, 36 pp., 14 pls., 1 text-fig. Price 50 cents.

An interesting popular account of agate with a series of good illustrations, some of which are coloured. Discussing the origin of agate, experiments are described on rhythmic precipitation in

colloids. Views are given of the present-day agate diggings in the ~~hi~~ Catalan district of Artigas, Uruguay. The artificial colouring of agates is sometimes stated to have been practised by the Romans, but this statement appears to be based on a mistranslation of Pliny. Many worked articles of agate have recently been found at Kish in Mesopotamia and at Khotan in Chinese Turkestan. Agate and carnelian have been worked for ages in China, where these stones take a place next to jade.

L. J. S.

KLEMM (R.) & WILD (Georg O.). *Zur Kenntnis des edlen Korundes.*

Neues Jahrb. Min., Abt. A, 1926, vol. 53, pp. 266-270, 1 pl.

Gem corundums fall into two groups: (1) ruby, in which the colour is due to chromium; (2) sapphire, including white, yellow, green, blue, reddish-violet, and violet stones, where the colour is due to the presence of colloidal particles. As shown by the ultra-microscope, these particles vary in number and size, and on these variations the differences in colour are supposed to depend. Spectroscopic analysis of sapphire showed the presence of iron and titanium, and the colloidal matter is therefore considered to be ilmenite. The ultra-microscope also shows larger 'submicrons' arranged in bands; these, rather than microscopic needles, are considered to be the cause of the 'silk' and asterism shown by the stones.

L. J. S.

SPENCER (L. J.). *A crystal of topaz.* Nat. Hist. Mag. Brit. Mus., 1928, vol. 1, pp. 197-200, 2 figs.

— *Recent acquisitions for the mineral collection of the British Museum (Natural History).* Amer. Min., 1928, vol. 13, p. 239. [Cf. M.A. 3-439.]

A clear transparent crystal of topaz with a pale blue tinge of colour measures $12 \times 11 \times 10$ cm. and weighs 2290 grams. The faces (*c m l y f X u i*, Dana) are marked by complex pyramids and lines of growth. It is from pegmatite at Tsaratanana, Maevatanana district, Madagascar.

L. J. S.

FERSMAN (A.). *Über das färbende Pigment der Smaragde.*—Ферсман (A. E.). О природе окраски изумрудов. Докл. Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), 1926, pp. 24-25. [German.]

Estimations by K. Nenadkevich of the amount of chromium in emerald from the Urals gave for a pale crystal 0.11% and for a crystal of medium depth of colour 0.19% (Cr or Cr_2O_3 ?). Traces of vanadium were also detected spectroscopically, but only in the dark-coloured specimens. The associated serpentine contains Cr_2O_3 0.23%.

Emerald occurrences appear to be of two types: (1) at the migmatic contact of pegmatite with serpentine (Urals, Habachthal, and Egypt), and (2) at the contact of pegmatite with bituminous limestone (Norway and Colombia). In the former the colouring matter of the emerald is chromium with very little vanadium; whereas in the latter, besides chromium, vanadium appears to be of importance.

L. J. S.

Economic Minerals and Ore-deposits.

HATCH (F. H.). *An introduction to the study of ore-deposits.* London (George Allen and Unwin), 1929, 117 pp., 31 figs. Price 7s. 6d.

This little book is based on a course of lectures given by the author at Cambridge before the war, but the matter has been completely revised and brought up to date. In just under a hundred pages, printed in large clear type, a concise and readable account is given of the different aspects of the subject, without any undue bias towards any one particular theory. The local examples are well chosen and are not too abundant, as is so often the case in books on ore-deposits. In books of reference these are of course wanted, together with a good index. In this excellent reading-book we also find four detailed indexes, more suitable for a book of reference.

L. J. S.

RASTALL (R. H.). *The magmatic origin of ores.* Geol. Mag. London, 1928, vol. 65, pp. 270-279.

An argument for the magmatic origin of many ore-deposits, including vein-deposits and replacements due to hot solutions emanating from igneous masses.

L. J. S.

KATO (Takeo). *Some characteristic features of the ore-deposits of Japan, related genetically to the late Tertiary volcanic activity.* Japanese Journ. Geol. Geogr., 1928, vol. 6, pp. 3-48, 5 figs.

A review, with brief descriptions of some typical mining districts and references to the literature, is given of Japanese ore-deposits. These are intimately connected with the late Tertiary volcanic rocks: (1) liparite and associated tuffs, (2) pyroxene-andesite and tuffs, and (3) minor intrusive dikes of andesite, porphyrite, &c. These rocks have been much altered by hydrothermal solutions, the liparites being usually silicified and sometimes sericitized, and the andesites and porphyrites usually propylitized. The same solutions deposited the ores in zoned or composite veins or as replacements of the rocks. The mineralizing solutions, ranging in character from pegmatitic-

pneumatolytic to hydrothermal, were the residual liquids from the later stages of consolidation of the magma which supplied the volcanic rocks; and it is believed that there are plutonic rocks at no great depth. Exhalations from the volcanic rocks themselves produced only insignificant deposits.

L. J. S.

ULRICH (František). *Výskyt rutilu na sideritových žilách u Rožňavy na Slovensku a jeho postavení v žilné paragenesi.* [The occurrence of rutile in the chalybite veins of Rožňava, Slovakia, and its position in the vein paragenesis.] *Rozpravy České Akad., Class 2, 1928, vol. 37, no. 8, 15 pp., 2 pls., 2 text-figs.*

Aggregates of fine needles of rutile, in part as reticular twinned groups with twin-plane (101) and showing the forms $e\ h\ \psi\ l\ k$ [Dana], have been found on rhombohedra of chalybite in a vein cavity. Other specimens show the rutile associated with albite, the cavity walls here consisting of an aplitic rock composed of albite, quartz, black tourmaline, apatite, rutile, and chalybite. A grouping of two tourmaline crystals shown in a micro-section corresponds with a twinning on (4041). These aplitic intrusions in the Rožňava-Nadabula district, and also in general in the Slovakian ore mountains, are always younger than the chalybite veins, and they are closely associated with the sulphide ores. This succession represents a case of 'vein rejuvenation', but the view advocated by G. Berg that the rejuvenation process took place during the Miocene andesite eruptions and their propylitization is disproved by the totally different chemical characters of the ore paragenesis in the Gemer-Spiš ore mountains on the one hand and in the Kremnica and Baňská Štiavnica districts on the other. On the contrary, the sulphide ores of the Gemer-Spiš ore mountains belong to the same geological period (late Palaeozoic) as the older chalybite in the same veins. Surface alteration of chalcopyrite and mercury-bearing tetrahedrite has given rise to malachite, chrysocolla, and earthy cinnabar. The statement that the tetrahedrite is a cementation product after chalcopyrite is erroneous. F. S.

SLAVÍK (František). *Nerosty z ložísk manganových rud v Železných horách.* Předběžný seznam s analysami V. VESELÉHO. [Minerals of the manganese ore deposits in the Železné hory. A preliminary list with chemical analyses by V. VESELÝ.] *Časopis Národního Muzea, 1928, vol. 102, pp. 112-127, with map.*

Manganese ores have been mined since 1915 along a 12 km. zone in Algongian rocks between Chvaletice and Sobolusky in the Železné

hory [= Iron Mts.] of eastern Bohemia. The deposits are mostly stratified, only near Litošice are there some veins, and the primary mineral is a massive manganese-iron carbonate. This is altered by surface weathering to a mixture of black oxides, and at the contact with granite it is metamorphosed to a compact silicate rock consisting of anthophyllite, garnet, rhodonite, &c. The veins near Litošice contain rhodochrosite and pyrite as the principal minerals. The deposits are worked at Chvaletice, Zdechovice, Marašice, Litošice, and Sobošluky, and the minerals from them have been already mentioned [M.A. 1-291, 1-329, 2-117, 2-141-2, 3-508]. The present list gives brief particulars of the minerals from each locality and includes: pyrite, pyrrhotine, mispickel, chalcopyrite, quartz, chalcedony, pseudochalcedonite, opal, haematite, goethite, stilpnosiderite and other varieties of limonite, manganite, hausmannite, psilomelane, wad, calcite, rhodochrosite, chalybite, aragonite, gypsum, alunite, alunogen, aluminate, destinezite (in workable quantities in the gossan), cacoxenite, vivianite and oxidation products (including a lemon-yellow amorphous ferric phosphate resembling a mineral from Kerch described by S. P. Popov), vashegyite and at least two other aluminium phosphates, garnet, asbestos-form manganiferous anthophyllite, rhodonite, and anthracite.

F. S.

ŠIMÁNĚ (Jaroslav). *Dolomit, jeho vlastnosti a zužitkování se zvláštním zřetelem k výrobě dolomitických maltovin.* [Dolomite, its properties and applications, with special reference to the manufacture of dolomite cements.] Zpráva o činnosti státního výzkumného ústavu pro průmysl silikátový za rok 1928 [Report on the work of the state research institute for silicate industry], Brno, 1928, pp. 73-222.

A detailed account of the physico-chemical and technological properties and natural occurrences of dolomite. The results are given of numerous experiments on the thermal dissociation of dolomite and magnesite, and on the properties of the resulting oxides.

F. S.

KALLAUNER (Otakar). *Dobšinský asbest.* [Asbestos from Dobšiná.] Zpráva o činnosti státního výzkumného ústavu pro průmysl silikátový za rok 1928 [Report on the work of the state research institute for silicate industry], Brno, 1928, pp. 269-274.

A technical account of the properties of chrysotile-asbestos from Dobšiná, Slovakia. Analysis gave SiO_2 41.25, Al_2O_3 2.94, Fe_2O_3

2.73 (=FeO 2.46), MgO 39.54, CaO nil, H₂O 13.32 = 99.78 (99.51).
Digested in HCl (sp. gr. 1.025) the fibre leaves a residue of 46.0 %,
and in 5 % soda solution 97.3 % is insoluble. F. S.

ŽELÍZKO (Josef V.). *Ložisko živce u Pisku.* [Felspar deposit near Písek.] Věstník Státního Geol. Ústavu Československé Republiky, 1928, vol. 4, pp. 23-30. [Czech, with French résumé.]

The old felspar quarry 'U obrázku' near Písek in Bohemia, which yielded many beryllium minerals forty years ago, has recently (1926) been reopened. Analysis of the felspar gave SiO₂ 68.82, Al₂O₃ 19.74, Fe₂O₃ 0.22, Na₂O 3.43, K₂O 7.24, ign. 0.38 = 99.83. F. S.

ROSE (H.). *Ein neues Selenerzvorkommen bei St. Andreasberg.* Fortschr. Min. Krist. Petr., 1927, vol. 12, pp. 72-74; Centr. Min., Abt. A, 1927, pp. 423-426; Zeits. Krist., 1928, vol. 66, pp. 480-483.

GEILMANN (Wilh.) & ROSE (Herm.). *Ein neues Selenerzvorkommen bei St. Andreasberg im Harz.* Neues Jahrb. Min., Abt. A, 1928, vol. 57, pp. 785-816, 5 pls.

A calcite vein carrying selenium ores has been found in Lower Devonian beds in the Roter Bär mine at Andreasberg, Harz. From chemical analyses of the massive ore the constituents are deduced as: clausthalite (PbSe) 78.2, tiemannite (HgSe) 14.2, guanajuatite (Bi₂Se₃) 2.5, zinc selenide (ZnS) 0.8, umangite (Cu₃Se₂) and berzelianite (Cu₂Se) 0.7, naumannite (Ag₂Se) 0.5, chalcopyrite 0.3, cobaltite 0.2 %, native gold trace. The characters of each of these constituents as observed on polished sections of the ore are described. [Cf. M.A. 3-402.]

L. J. S.

EHRENBURG (H.). *Über eine Abart des Pyrits in metasomatischen Blei-Zinkerzlagerstätten.* Fortschr. Min. Krist. Petr., 1927, vol. 12, pp. 28-30; Centr. Min., Abt. A, 1927, pp. 405-407; Zeits. Krist., 1928, vol. 66, pp. 478-480.

— *Das Auftreten und die Eigenschaften ehemaliger FeS₂-Gele insbesondere auf metasomatischen Blei-Zinkerzlagerstätten.* Neues Jahrb. Min., Abt. A, 1928, vol. 57, pp. 1303-1320, 1 pl.

Banded pyrite, with fibrous, granular, or compact structure, is described from the lead-zinc deposits near Aachen, Wiesloch (Baden), and Scharley (Silesia). Examined on polished surfaces it shows certain differences from ordinary pyrite, but it is quite distinct from marcasite. X-ray powder photographs show only slight deviations from

the pyrite structure. Chemical analyses show a deficiency of sulphur, which is explained by the admixture of FeS (up to 30%). Pyrrhotine can be detected on the polished sections after they have been heated at 475° C. for two days. It is suggested that the material was deposited as a gel, which afterwards crystallized. [Cf. M.A. 3-453.]

L. J. S.

GEIER (Bruno). *Beiträge zur Frage der Entstehung der bolivianischen Kupfererzlagerstätten vom Typus Corocoro.* Neues Jahrb. Min., Abt. A, 1928, vol. 58, pp. 1-42, 2 pls., 2 maps.

These deposits are situated in the N-S. trough between the Cordillera Real and the Coastal Cordillera, and extend from Corocoro, through Yarvicoya and Cobrizos in Bolivia, to San Bartolo in Chile. They lie to the west of the Bolivian silver-tin deposits. The ore-mineral is mainly native copper with small amounts of chalcosine, covellite, domeykite, native silver, &c., with associated gypsum, baryte, celestine, and copper pseudomorphous after aragonite. These occur as concretionary impregnations in Pliocene rocks, which have hitherto been described as sandstones and conglomerates, but which are now shown to consist largely of volcanic tuff, often with clayey material (tuffite), and were probably accumulated under continental conditions. The impregnating hot solutions, carrying probably copper chloride and bicarbonate, no doubt emanated from the magma which gave rise to the dioritic-andesitic rocks of the neighbourhood.

L. J. S.

JACK (R. Lockhart). *Pigment minerals of South Australia.* Bull. Geol. Survey South Australia, 1928, no. 13, 70 pp., 4 pls., 10 text-figs.

An account of the workable deposits with several chemical analyses of the raw materials. The most important are baryte (worked in five counties), talc, and ochres. White paints are prepared from baryte, talc, clay, gypsum, silica, whiting, and ilmenite; coloured from ochres and copper carbonates; and black from graphite and manganese dioxide. Light yellow carphosiderite is available in large amounts at Boolcoomatta near Olary, and has probably been formed by the arid weathering of a pyritic body. Analysis by W. S. Chapman gave: SO_3 28.22, Fe_2O_3 35.57, Al_2O_3 3.07, CaO 0.80, Na_2O 3.96, Cl 0.54, H_2O 11.55, insol. 17.36 = 101.07. The mineral is roasted for the preparation of red oxide.

L. J. S.

RUMBOLD (W. G.). *Bauxite and aluminium.* Imperial Institute. Monographs on mineral resources with special reference to the British Empire. London (John Murray), 1926, ix + 110 pp., 1 map. Price 6s.

A concise general account of the properties, preparation, and uses of bauxite, with details of its occurrence and production in different countries.

L. J. S.

MIDDLEMISS (C. S.). *Bauxite deposits of Jammu province.* Mineral Survey Reports, Jammu & Kashmir Government, Jammu, 1928, iv + 60 + iv pp., 17 pls.

The bauxite series with a thickness of 4-24 ft. in the Riasi district, Kashmir, covers the Great Limestone (Trias ?) with an intervening bed of brecciated chert probably derived from the limestone, and is overlain by coal-measures (Eocene ?). It grades from bauxite above, through bauxitic clay, to kaolin at the base. Ninety-four partial chemical analyses of these materials show ranges: SiO_2 1-45, Al_2O_3 46-82, Fe_2O_3 1-7, TiO_2 2-16, H_2O 12-15 %, sp. gr. 2.50-3.25. The bauxite is a monohydrate of alumina; it is pisolithic or compact, cream to grey, and very hard (H. 6½). It is difficultly soluble, but when digested with caustic soda under pressure a large part is dissolved. It is thought that the upper layer of bauxite is a surface weathering product of the kaolin. Several trial pits were sunk and the reserves of high-grade bauxite are estimated at nearly two million tons.

L. J. S.

WLODAWEZ (N. I.) [= Влодавец (Н. И.) = VLODAVETZ (N. I.)]. *Nephelin.* Zeits. Prakt. Geol., 1929, vol. 37, pp. 10-13.

Nepheline sand occurs in large quantities on the shores of lake Imandra in the Kola peninsula, and being close to the railway line it has possible economic uses. Trials have been made in using it as a substitute of sodium sulphate in the manufacture of bottle-glass. Chemical analyses are quoted and references given to the Russian literature.

L. J. S.

LUNDE (Gulbrand) & JOHNSON (Mimi). *Vorkommen und Nachweis der Platinmetalle in norwegischen Gesteinen. II.* Zeits. Anorg. Chem., 1928, vol. 172, pp. 167-195.

Further notes [M.A. 3-399] on the estimation of traces of platinum metals, palladium, gold, and silver in Norwegian rocks. The following were the largest amounts of platinum metals obtained: in peridotite 0.000074 %, serpentine 0.00003 %, chromite veins in serpentine

0.000128 %, chromite 0.0020 %, together with traces of silver but no gold.

L. J. S.

WILSON (M. E.). *Talc deposits of Canada*. Geol. Survey Canada, Econ. Geol. Ser. no. 2, 1926, no. 2092, v + 149 pp., 16 pls., 17 text-figs. Price 25 cents.

The occurrences at several localities in British Columbia, Ontario, and Quebec are described in detail. They are of three types: (1) white or light-grey high-grade talc associated with metamorphosed dolomite; (2) grey or green (usually impure) talc associated with basic igneous rocks; (3) pure foliated talc in smaller amounts as veins cutting soapstone or serpentine. The most important deposits are those near Madoc in Hastings Co., Ontario, which are in a tremolitic dolomite near a granite contact. Dikes associated with the deposit consist of brown tourmaline with some actinolite and pyrite, a rock for which the name madocite is suggested. The talc appears to have been formed by the silication of the dolomite by solutions emanating from the granite.

L. J. S.

HURST (M. E.). *Arsenic-bearing deposits in Canada*. Geol. Survey Canada, Econ. Geol. Ser. no. 4, 1927, no. 2131, iv + 181 pp., 21 figs. Price 30 cents.

After a brief account of the uses and mineralogy of arsenic, details are given of the occurrence of arsenic minerals at 125 localities in Canada. White arsenic (As_2O_3) is obtained as a by-product from metallic ores, the bulk of the production in Canada being now from the arsenides of the cobalt-silver ores of the Cobalt district. An outline is also given of foreign deposits.

L. J. S.

EARDLEY-WILMOT (V. L.). *Abrasives. Products of Canada: technology and application. Part I, Siliceous abrasives: sandstones, quartz, tripoli, pumice, and volcanic dust*. Canada, Dept. Mines, Mines Branch, Ottawa, 1927, no. 673, xi + 119 pp., 14 pls., 18 tables, 8 text-figs. Price 30 cents.

— *Part II, Corundum and diamond*. Ibid., 1927, no. 675, v + 51 pp., 5 pls., 4 tables, 6 text-figs. Price 15 cents.

— *Part III, Garnet*. Ibid., 1927, no. 677, vii + 69 pp., 4 pls., 6 tables, 19 text-figs. Price 20 cents.

A detailed account is given of the occurrence, production, and uses of various kinds of abrasives in Canada as well as in other countries. Part IV on artificial abrasives is promised.

L. J. S.

WILDER (Frank A.). *Gypsum and anhydrite*. Amer. Min., 1928, vol. 13, pp. 476-480, 3 figs.

In many of the gypsum deposits of eastern Canada and the United States the mineral passes downwards into anhydrite, suggesting that it has been derived from anhydrite. L. J. S.

MACGREGOR (A. M.). *The geology of the country around the Lonely mine, Bubi district*. Southern Rhodesia Geol. Survey Bull., 1928, no. 11, 96 pp., 3 maps, 7 pls., 3 text-figs.

The Lonely mine was discovered about 1906 by reopening an ancient working. It is now the deepest mine (4,025 feet) working on a quartz reef in Africa. The reef occupies a fault-fissure among greenstones and serpentines of the Basement Schist Series, along which movement took place after the introduction of the quartz. This is shown by the shattering and re-cementation of the reef, by the presence of a strong clay seam, and by the complete oxidation of the ore down to a vertical depth of 1,550 feet, and its partial oxidation down to 3,000 feet. Pyrite is the only sulphide present in the higher levels, but below 3,000 feet zinc-blende, galena, and chalcopyrite make their appearance; at the same time the fineness of the gold decreases. The reef has been followed more than a thousand feet along the strike; the average width is thirty inches, and the average yield of gold about 26 pennyweights per ton. S. J. S.

KEEP (F. E.). *Interim report on the geology of the chromite deposits of the Umvukwe range, Lomagundi district*. Southern Rhodesia Geol. Survey, 1928, Short Rep. no. 23, 10 pp., 1 map, 2 pls.

These deposits occur in the northern part of the Great Dyke; they form thin seams within serpentized enstatite-rock. The seams have a gentle synclinal arrangement within the Dyke, and their thickness averages $7\frac{1}{2}$ in., rising to a maximum of 30 in. The content of Cr_2O_3 is in the neighbourhood of 52 %. It is estimated that at least 200,000 tons of chromite can be produced, for every 100 feet of incline depth, from each $2\frac{3}{4}$ square miles of country. S. J. S.

Minerals of the Empire. British Empire Exhibition, Wembley, 1924, Imperial Mineral Resources Bureau, 314 pp., 1 pl. Price 5s.

This gives a useful outline of the workable deposits of economic minerals in each country of the British Empire. The arrangement is alphabetical: aluminium and bauxite, antimony . . . uranium (radium) minerals, vanadium, zinc. It summarizes the information

given in the series of fifty volumes and pamphlets [M.A. 1-85, 3-493] issued by the Bureau and later by the Imperial Institute.

The mineral industry of the British Empire and foreign countries. Statistical summary (production, imports and exports) 1925-1927.

London (Imperial Institute), 1928, 375 pp. Price 8s.

This annual publication gives tables of the amounts of production, &c., for each mineral, over a period of three years, for every country from which the information is available.

L. J. S.

Miscellaneous.

AVRINECZ (Gábor). *Borostyánkői pseudophit további vizsgálata.* [Further investigation on pseudophite from Borostyánkő.]

Magyar Chem. Folyóirat, Budapest, 1928, vol. 34, pp. 149-150.

AVRINECZ (Gabriel). *Analysen von Pseudophit (und Serpentin) aus Ungarn.* Centr. Min., Abt. A, 1929, pp. 24-26. [Cf. M.A. 3-505.]

A new analysis of dark leek-green pseudophite with greenish-white streak and hardness $2\frac{1}{2}$ gave: SiO_2 33.04, Al_2O_3 17.72, Fe_2O_3 0.66, FeO 3.00, MgO 32.07, CaO 0.67, H_2O 13.40 = 100.56. This does not agree with Tschermak's orthochlorite ratio 2:3:2, and a third isomorphous molecule is suggested, viz. $\text{H}_4\text{MgAl}_2\text{SiO}_8 = \text{At}'$, the general formula being then written $\text{Sp}_{5.12}\text{At}_{3.18}\text{At}'_{1.7}$. K. Z.

KRENNER (József) [1839-1920]. *Metacinnabarit Felsőbányáról.*—

KRENNER (Josef). *Metacinnabarit von Felsőbánya.* Mat. Természettud. Értesítő, Budapest, 1928, vol. 45, pp. 15-18 (Hung.), p. 19 (Germ.), 2 figs.

KRENNER (Josef). *Mineralogische Mitteilungen aus Ungarn. 1. Metacinnabarit von Felsőbánya.* Centr. Min., Abt. A, 1927, pp. 362-365, 2 figs. [Cf. M.A. 3-548. 4-8.]

Small crystals of metacinnabarite, a mineral new for Hungary, were found embedded in baryte crystals, on quartz, and with wurtzite on stibnite. The new form (311) predominates, with (111), ($\bar{1}11$), (100). Analysis by J. Loczka gave S 14.05, Hg 85.35, Zn 0.72, Fe 0.32 = 100.76; sp. gr. 7.54. L. J. S.

KRENNER (József) [1839-1920]. *Inesit Nagybányáról.*—KRENNER (Josef). *Inesit von Nagybánya.* Mat. Természettud. Értesítő, Budapest, 1928, vol. 45, pp. 10-11 (Hung.), p. 12 (Germ. summary). [See M.A. 3-548.]

JEŽEK (Bohuslav). *K nálezu zlata u Vodňan.* [On the gold found near Vodňany.] Bánský Svět, Praha, 1927, vol. 6, pp. 49-54, 5 figs.

SLAVÍK (František). *Nález zlata u Křepic, jižně od Vodňan.* [The gold found near Křepice, south of Vodňany.] Věda Přírodní, Praha, 1927, vol. 8, p. 218.

A loose block of quartz found in 1927 contains numerous flakes of gold (electrum, with Au 53 %), the largest flake measuring 8×3 cm. and weighing 16.50 grams. Quartz veins occur in the neighbourhood, and there are traces of old gold washings on the river Blanice in southern Bohemia. In the second note it is shown that the surface of the flakes is parallel to the plane (111) with triangular hillocks bounded by (311). The fact that the crystalline structure of the flakes is impressed on the quartz in which they are embedded suggests that there was a later deposition of colloidal silica during the process of cementation.

F. S.

GIANNOTTI (C.). *Wollastonite nella formazione granitica di Gavorrano.* Atti (Proc. Verb.) Soc. Toscana Sci. Nat., 1924, vol. 33, pp. 37-42.

Large laminae of wollastonite are found in a rock enclosed in porphyritic granite from Gavorrano, Tuscany. Calcite and a little quartz are compressed between the laminae, and the wollastonite is of metamorphic origin. Twinning frequently occurs parallel to the cleavage plane (100). The birefringence of the mineral is moderate and negative although the sign of elongation is variable; $\alpha : c = 32^\circ$. An analysis of the mineral freed from pyrite, quartz, and calcite gave SiO_2 52.57, Al_2O_3 0.24, Fe_2O_3 0.12, FeO 0.42, MnO 0.14, CaO 43.94, MgO 1.74, H_2O 1.14 = 100.31.

F. A. B.

D'ACHIARDI (G.). *Il ritrovamento dell'anidrite nella regione dei soffioni boriferi a Castelnuovo Val di Cecina (Pisa).* Atti (Proc. Verb.) Soc. Toscana Sci. Nat., 1926, vol. 35, pp. 25-30.

In a deep boring for steam at Castelnuovo, there occurs at a depth of 50-80 metres a snow-white rock consisting chiefly of gypsum. The author also found considerable unaltered anhydrite which on analysis corresponded very closely to the theoretical formula. This mineral occurs as small laminae exhibiting the usual cleavages. The origin of the anhydrite is discussed; calcareous inclusions in the rock and the presence of abundant pyrite in the underlying quartzite stratum are evidence of metamorphism. Pyrite rarely occurs in the

anhydrite-bearing rock, but, when it does, it is always fresh. Hence the anhydrite does not result from an alteration of the pyrite.

F. A. B.

LINGEN (J. Steph. van der). *Garnets.* South African Journ. Sci., 1928, vol. 25, pp. 10-15, 1 fig.

Describes the emission and absorption spectra of various South African garnets. From a large series of observations (not detailed) it is concluded that yttria is not uncommonly present in these garnets, and a new name 'emildine' is proposed for a spessartine containing yttria and lacking the uvarovite and pyrope molecules. A garnet from pegmatite at Jakhalswater showed an appreciable content of lithia. Garnets from the diamond pipes are mainly pyrope, and in every case the spectroscope showed the presence of the uvarovite molecule, but no rare earths were detected in these garnets. The presence of yttria in addition to magnesia and chromic oxide was demonstrated in garnets from the contact zone of the Cape granite. For such a garnet the name 'erinadine' is proposed.

S. J. S.

SHANNON (Earl V.) & GONYER (Forest A.). *Almandite-spessartite garnet from Gwynns Falls, Baltimore.* Journ. Washington Acad. Sci., 1927, vol. 17, pp. 534-536.

Small brownish-red crystals of garnet (n 1.808) in granite-pegmatite gave SiO_2 35.82, Al_2O_3 21.39, Fe_2O_3 1.44, FeO 21.58, MnO 17.15, MgO 0.48, CaO 2.34 = 100.20, corresponding with $\text{Fe}_3\text{Al}_2\text{Si}_3\text{O}_{12}$ 49.87, $\text{Mn}_3\text{Al}_2\text{Si}_3\text{O}_{12}$ 40.17, $\text{Ca}_3\text{Fe}_2\text{Si}_3\text{O}_{12}$ 4.58, $\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$ 2.26, $\text{Mg}_3\text{Al}_2\text{Si}_3\text{O}_{12}$ 1.62, Al_2O_3 1.82 %. The basic acetate method for separating manganese from iron and aluminium is not reliable.

L. J. S.

SHANNON (Earl V.) & GONYER (Forest A.). *Natrojarosite from Kingman, Arizona.* Journ. Washington Acad. Sci., 1927, vol. 17, pp. 536-537.

Minerals of the jarosite group [M.A. 3-470] are of common occurrence in the oxidized portions of ore-deposits, and have often been mistaken for limonite. Ochreous material from near Kingman shows flattened crystal grains with ω 1.829, ϵ 1.760, and gave on analysis SO_3 33.71, Fe_2O_3 48.23, Al_2O_3 0.09, FeO 0.58, MgO 0.05, CaO 0.05, Na_2O 4.28, K_2O 2.28, PbO trace, Ag_2O nil, $(\text{NH}_4)_2\text{O}$ nil, insol. 0.22, H_2O 10.76 = 100.25, agreeing with the usual formula $(\text{Na}, \text{K})_2\text{O} \cdot 3\text{Fe}_2\text{O}_3 \cdot 4\text{SO}_3 \cdot 6\text{H}_2\text{O}$.

L. J. S.

PHILIPSBRON (H. v.). *Beziehungen zwischen Lichtbrechung, Dichte und chemischer Zusammensetzung in der Granatgruppe.* Abhand. Math.-physis. Kl. Sächs. Akad. Wiss. Leipzig, 1928, vol. 40, no. 3, 43 pp., 15 figs.

The relations between the refractive index, density, and chemical composition of members of the garnet group are shown by plottings on a tetrahedron with grossular, almandine, pyrope, and andradite at the four corners. The data used are mainly those of W. E. Ford [M.A. 2-37], with several new determinations for the dispersion $n_{Tl} - n_{Li}$. Planes of equal refraction, dispersion, density, and of the components CaO, FeO, &c., are drawn within the tetrahedron. The lines of intersection of the planes of equal refraction and of equal density run approximately parallel to the tetrahedron face grossular-pyrope-andradite, so that it is possible to deduce the amount of the almandine component from a determination of the refraction and density alone. Plots are also given with a fifth component distributed equally at the four corners of the tetrahedron.

L. J. S.

TILLEY (C. E.). *On a custerite-bearing contact rock from California.* Geol. Mag. London, 1928, vol. 65, pp. 371-372.

Custerite $(\text{Ca}[\text{F},\text{OH}])_2\text{SiO}_3$, previously known only from Custer Co., Idaho, is recorded from the metamorphic limestones of Crestmore, California. Together with monticellite and calcite, it forms the cementing material between crystals of idocrase. It is monoclinic with lamellar twinning and cleavage (001); $a = b$, $\beta : (001) = 6^\circ$, $a : 1.588$, $\gamma : 1.600$, positive. Merwinite is mentioned in metamorphic limestones from Crestmore, California; Larne, Ireland; and Velardeña, Mexico.

L. J. S.

NORTH (F. J.) & HOWARTH (W. E.). *On the occurrence of millerite and associated minerals in the Coal Measures of South Wales.* Proc. South Wales Inst. Engineers, 1928, vol. 44, pp. 325-348, 2 pls., 4 text-figs.

HOWARTH (W. E.). *On the occurrence of linnaeite in the Coal-measures of South Wales.* Geol. Mag. London, 1928, vol. 65, pp. 517-518.

A general account is given of the occurrence of millerite in the crevices of nodules of clay-ironstone, limestone, and pyrites, and fifteen localities are recorded in the neighbourhood of Merthyr Tydfil in the eastern part of the coalfield. Associated minerals are quartz, calcite, dolomite, ankerite, baryte, chalcopyrite, blende, galena,

and hatchettine. Linnaeite as minute (0.4 mm.) octahedra on the hairs of millerite is recorded from six localities. L. J. S.

PARSONS (A. L.). *The dehydration of gypsum.* Univ. Toronto Studies, Geol. Ser., 1927, no. 24, pp. 24-27.

The loss of water from gypsum at various temperatures is recorded ; at 115° C. less than 1 % remains. Optical examination of materials in the various stages in the manufacture of plaster-of-Paris shows that these consist of a mixture of unaltered gypsum (γ 1.53) and bassanite (CaSO_4 ; n slightly higher and lower than 1.5509). There was no evidence for the presence of the hemihydrate, $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$, which has been prepared only from solution. L. J. S.

RAMSDELL (L. S.) & PARTRIDGE (E. P.). *The crystal forms of calcium sulphate.* Amer. Min., 1929, vol. 14, pp. 59-74, 3 figs.

A good review is given of the more important literature on the different forms of hydrous and anhydrous calcium sulphate. These are gypsum, the hemihydrate, and anhydrite ; the 'soluble anhydrite' being identical with the hemihydrate largely dehydrated by loss of zeolitic water, but, as shown by X-ray examination, without any change in crystal-structure. The rates of dehydration and hydration are slow, and are much influenced by the vapour-pressure of the atmosphere. Gypsum heated in air at 120-180° C. slowly loses 20.31 % H_2O (of the total 20.93 %), and the product differs in its optical properties and in its X-ray pattern from dead-burnt gypsum and anhydrite. This product, when exposed to the air for several days, reabsorbs 5.57 % H_2O (5.24 % required for $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$). Gypsum heated in water at 100° C. for 46 days is completely converted into anhydrite. Anhydrite in water at 11-15° C. is largely converted into gypsum after 120 days. The equilibrium diagram of calcium sulphate and water and its application to the setting of plaster-of-Paris are discussed. L. J. S.

SWAMINATHAN (V. S.). *The mode of occurrence and chemical composition of beryl from Nellore. With a note on its industrial and chemical applications.* Trans. Mining & Geol. Inst. India, 1928, vol. 22, pp. 258-267, 1 fig.

Rough crystals, up to a foot across, of yellow and blue beryl occur in pegmatite in several of the mica mines. It is usually associated with the quartz core of the pegmatite masses. Sp. gr.

2.624-2.652. About 3 to 5 tons could be collected annually. Analysis I from Lakshminarayana mine and II from Kubera mine.

| | SiO ₂ . | Al ₂ O ₃ . | Fe ₂ O ₃ . | BeO. | CaO. | Na ₂ O. | Li ₂ O. | H ₂ O. | Total. |
|-----|--------------------|----------------------------------|----------------------------------|-------|------|--------------------|--------------------|-------------------|--------|
| I. | 67.28 | 16.10 | 0.43 | 13.51 | 0.48 | 0.64 | trace | 1.60 | 100.04 |
| II. | 64.78 | 16.56 | 1.99 | 13.53 | 0.52 | 0.56 | trace | 2.10 | 100.04 |

L. J. S.

CHRISTIE (W. A. K.) & COULSON (A. L.). *A zinc spinel* [i. e. zinc-spinel] from southern India. Rec. Geol. Survey India, 1928, vol. 61, pp. 315-317.

A greenish-black mineral with imperfect octahedral cleavages from Tummalatalupur, Nellore district, Madras, has sp. gr. 4.55, H. 8, n_{v_a} 1.802. Analysis, SiO₂ 0.12, ZnO 38.90, MnO 0.52, FeO 4.67, Al₂O₃ 54.66, Fe₂O₃ 0.81, H₂O 0.13, total 99.81, proves it to be gahnite.

L. J. S.

COULSON (A. L.). *Löllingite from the Hazaribagh district, Bihar and Orissa*. Rec. Geol. Survey India, 1928, vol. 61, p. 325.

Lumps of white löllingite have been found in the mica mines. Sp. gr. 7.40, 7.05, 6.55.

L. J. S.

YOSHIKI (Bumpei). *On the diaspore from Shikizan, prov. Bingo*. Japanese Journ. Geol. Geogr., 1928, vol. 5, Abstracts p. (19) [from Journ. Geol. Soc. Tokyo, 1927, vol. 34, pp. 29-36, Japanese].

The diaspore crystals occur in veins or in masses of pyrophyllite, usually associated with kaolin. Crystal-forms, *bekhs* [Dana] and new (103): Optical orientation, $\alpha = c$, $\beta = b$, $\gamma = a$. α 1.702, β 1.722, γ 1.747, 2V 88° 24' (Na). Analysis gave SiO₂ 1.37, Al₂O₃ 84.23, CaO 0.10, ign. 14.67 = 100.37.

L. J. S.

KINOSHITA (Kameki). *A manganese silicate from the Hôkô mine, prov. Aki*. Japanese Journ. Geol. Geogr., 1928, vol. 5, Abstracts p. (19) [from Journ. Geol. Soc. Tokyo, 1927, vol. 34, pp. 52-58, Japanese].

The mineral occurs with psilomelane and rhodochrosite as a bedded deposit in Palaeozoic hornstone. It is dark brown to black with resinous to vitreous lustre and brownish-black streak. Under the microscope it is light brown and optically isotropic. H. 3½, sp. gr. 3.354. Analysis, SiO₂ 20.61, Al₂O₃ 2.09, Fe₂O₃ 1.65, Mn₂O₃ 18.89, MnO 46.56, Cu 0.14, MgO 1.63, CaO 1.07, H₂O 4.00, H₂O(110°) 5.89

[= 102.53], corresponds to $2(\text{MnO}, \text{Mn}_2\text{O}_3)\cdot\text{SiO}_2 \cdot \text{H}_2\text{O}$. The mineral differs from marceline in containing water. L. J. S.

YAMAGUCHI (Kenji). *On the optical properties of aragonite from Matsushiro, prov. Iwami.* Japanese Journ. Geol. Geogr., 1928, vol. 5, Abstracts p. (20) [from Journ. Geol. Soc. Tokyo, 1927, vol. 34, pp. 159-174].

Nodular aggregates of aragonite crystals occur in Tertiary clay above a deposit of gypsum. Analysis gave CaO 55.96, MgO 0.03, CO_2 43.95, insol. 0.13 = 100.07; sp. gr. 2.9363. α 1.52960, β 1.68040, γ 1.68495(Na), $2E$ $30^\circ 55'$, $2V$ $18^\circ 15'$. L. J. S.

NISHIO (SHIGERU). *Variation of the refractive indices of sphalerites and their iron contents.* Journ. Fac. Engin. Univ. Tokyo, 1928, vol. 17, pp. 183-189, 4 figs.

By the immersion method in fused mixtures of sulphur and selenium, determinations for different wave-lengths were made of the refractive indices of blende from several Japanese localities, and the results are plotted on curves. The extreme values for sodium-light are 2.370 (with 1.16 % Fe) and 2.428 (with 10.35 % Fe). For wave-length $648 \mu\mu$ the first of these samples had n 2.350. L. J. S.

KANI (Koichi). *Thermo-optic study of dolomite.* Japanese Journ. Geol. Geogr., 1928, vol. 6, Abstracts p. (1) [from Journ. Geol. Soc. Tokyo, 1928, vol. 35, pp. 279-286, Japanese].

Dolomite from Manchuria begins to decompose or dissociate at 800° ; the iron and magnesium carbonates are completely dissociated at 820° , and the calcium carbonate at 920° C. $\text{CaCO}_3 \cdot (\text{Mg}, \text{Fe})\text{CO}_3 \rightarrow \text{CaCO}_3 + \text{MgCO}_3 + \text{FeCO}_3$ at about 800° ; $\text{MgCO}_3 + \text{FeCO}_3 \rightarrow \text{MgO} + \text{FeO} + \text{CO}_2$ at $800-830^\circ$; $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ at $800-920^\circ$ C. L. J. S.

HARBICH (Egon). *Trachtstudien an einfachen und Zwillingeskristallen der basaltischen Hornblende.* Min. Petr. Mitt. (Tschermak), 1928, vol. 39, pp. 204-219, 13 figs.

Crystals of hornblende (sp. gr. 2.711-3.250) from the basalt-tuffs of the Midland Mts. of Bohemia and the Vogelsberg in Hesse vary slightly in habit, being either short- or long-prismatic. Measurements of the central distance of the several faces (half the thickness of the crystal between pairs of parallel faces determined with a slide-gauge) were made for 173 simple crystals and 123 twins. This central distance divided by the radius of a sphere of equal volume of each crystal gives the relative central distance for comparing the values

obtained on the different crystals. Twinned crystals show a greater tendency to the long-prismatic habit. L. J. S.

MATTHES (Otto). *Ueber Epidot.* Neues Jahrb. Min., Abt. A, 1928, vol. 56, pp. 357-422, 1 pl., 7 text-figs.

A detailed and critical discussion of the zones and crystal-forms of epidote. 119 certain forms are listed with angles and plotted on a gnomonic projection. These include four new forms $s(\bar{7}.0.10)$, $\mu(\bar{4}05)$, $\theta(\bar{5}04)$, $t(307)$ observed on crystals from Untersulzbachthal, Salzburg. [$a:b:c = 1.5807:1:1.8057$, $\beta = 64^\circ 36'$.] L. J. S.

SEIFERT (H.). *Zwillinge von Periklas.* Centr. Min., Abt. A, 1926, pp. 305-307.

Crystals of periclase twinned according to the spinel-law are described from a furnace of a hydrochloric acid factory in Neu-Stassfurt. Crystallographic measurements of the twinning are given, together with observations on the vicinal faces of the etch-figures occurring on the octahedral faces. The crystals exhibit cleavage (100) and a plane of parting (110). F. A. B.

PAPISH (Jacob) & HOLT (Donald A.). *Gallium. I. Arc spectrographic detection of gallium. II. Extraction of gallium from lepidolite.* Journ. Physical Chem., 1928, vol. 32, pp. 142-147.

Fifty-five minerals were examined spectrographically for gallium. Lepidolite from California yielded Ga 0.007 %. L. J. S.

PAPISH (Jacob), BREWER (F. M.), & HOLT (Donald A.). *Germanium. XXV. Arc spectrographic detection and estimation of germanium. Occurrence of germanium in certain tin minerals Enargite as a possible source of germanium.* Journ. Amer. Chem. Soc., 1927, vol. 49, pp. 3028-3033.

Cassiterite from Nevada gave Ge 0.005 %; enargite from Mexico Ge 0.1 %, and from some other localities 0.01 %. L. J. S.

HEIDE (F.). *Über eine hydrothermale Paragenesis von Quarz und Arsenmineralien im veränderten Quarzporphyr vom Saubach i. V. und über einige Eigenschaften des Pharmakosiderits und des Symplesits.* Zeits. Krist., 1928, vol. 67, pp. 33-90, 12 figs.

The hydrothermal paragenesis of quartz twins and arsenic minerals (mispickel, scorodite, &c.) in the quartz-porphyry of Saubach in Vogtland [M.A. 3-378, 3-553] is discussed in detail. The pleochroism and changes in colour of cassiterite when heated are described. Experiments were made on the dehydration and optical anomalies of

pharmacosiderite, and optical data are given for bent crystals of symplesite.

L. J. S.

AMINOFF (Gregori). *Ur prof. Hj. Sjögrens efterlämnade anteckningar.*

I. Plumboferrit från Jakobsberg. Geol. För. Förh. Stockholm, 1925, vol. 47, pp. 266-268.

The following analyses by R. Mauzelius [1864-1921] of plumboferrite from Jakobsberg, Sweden, were found amongst the notes left by H. Sjögren [1856-1922] at the Stockholm Museum. They lead to the formula $\text{PbO} \cdot 2\text{Fe}_2\text{O}_3$.

| Fe_2O_3 . | FeO . | MnO . | PbO . | CaO . | MgO . | H_2O . | insol. | Total. | Sp. gr. |
|---------------------------|----------------|----------------|----------------|----------------|----------------|------------------------|--------|--------------------|---------|
| 63.66 | 0.67 | 1.13 | 32.30 | 0.43 | 0.65 | 0.32 | 0.39 | 99.88 ¹ | 5.98 |
| 63.11 | 0.73 | 1.96 | 32.86 | 0.35 | 1.12 | 0.27 | 0.08 | 100.48 | 6.02 |

¹ Incl. Cu (native) 0.24, Ti_2O_3 (?) 0.09.

L. J. S.

LARSEN (Esper S.). *Wöhlerite and hiortdahlite from Vesuvius.*

Festschrift Victor Goldschmidt, Heidelberg, 1928, 172-174.

Vesuvian specimens labelled 'guarinite' show two yellow minerals differing in their optical characters. The better crystals in cavities have α 1.704, β 1.716, γ 1.727, and are identified as wöhlerite. Poorly crystallized material in the matrix has α 1.653, β 1.658, γ 1.664, and is identified as hiortdahlite. These data are compared with those of wöhlerite (α 1.700, β 1.716, γ 1.726, 2V 71-79°, $\alpha:c = -45^\circ$, sp. gr. 3.42) and hiortdahlite (α 1.652, β 1.658, γ 1.665, 2V near 90°, sp. gr. 3.235) from Langesund, Norway. It is suggested that the Vesuvian crystals measured by F. Zambonini (Min. Mag., 1909, vol. 15, p. 247) were wöhlerite rather than hiortdahlite, and that the material analysed by G. T. Prior consisted of a mixture of the two.

L. J. S.

RICHARDS (Gragg). *Newberryite and other phosphates from Ascension Island.* Amer. Min., 1928, vol. 13, pp. 397-401.

A botryoidal crust on lava collected by R. A. Daly [M.A. 3-385] from a cavern in a basalt flow on Ascension, South Atlantic, consists of: (1) an outer layer of white crystalline newberryite [$2\text{MgO} \cdot \text{P}_2\text{O}_5 \cdot 7\text{H}_2\text{O}$] with α 1.517, β 1.520, γ 1.531, 2V 35°, sp. gr. 2.30; (2) an intermediate brownish layer of collophanite [$3\text{CaO} \cdot \text{P}_2\text{O}_5 \cdot \text{H}_2\text{O}$], isotropic, n 1.58-1.59, sp. gr. 2.40-2.75; (3) an inner layer, next the basalt, of martinite, slightly reddish, with α 1.590, β 1.602, γ 1.617, 2V near 90°, sp. gr. 2.8; analysis by S. Parker gave P_2O_5 44.19, CaO 40.50, FeO 0.62, MnO 0.39, MgO 0.21, Na_2O 1.34, K_2O 0.94, SiO_2 3.76,

$\text{H}_2\text{O} + 7.39, \text{H}_2\text{O} - 0.83 = 100.17$, agreeing with $5\text{CaO} \cdot 2\text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$, i. e. twice the amount of water usually assigned to martinite.

L. J. S.

PALACHE (Charles) & ELLSWORTH (H. V.). *Zircon from North Burgess, Ontario*, Amer. Min., 1928, vol. 13, pp. 384-391, 1 pl., 1 text-fig. (Correction, p. 594.)

Dark red-brown crystals from the apatite and mica mines show the forms $m\,p\,u\,x\,\zeta\,v$ [Dana], with $cp\ 42^\circ\ 16\frac{1}{2}'$, $a:c = 1:0.6429$, this value being rather higher than for zircon from other localities. When heated to redness the crystals are completely decolorized and there is an increase of $1'$ in the angle cp . The refractive indices ($\omega\ 1.950$, $\epsilon\ 2.008$ for $\lambda = 480\ \mu\mu$) show a slight decrease ($\omega\ 1.946$, $\epsilon\ 2.003$) after heating. Sp. gr. 4.658 and 4.646, after heating 4.667 and 4.659 respectively. Analysis gave $\text{SiO}_2\ 32.51$, $\text{ZrO}_2\ 67.02$, rare earths 0.04, Al_2O_3 &c. 0.21, $\text{Fe}_2\text{O}_3\ 0.08$, $\text{MgO}\ 0.01$, $\text{CaO}\ 0.22$, ign. 0.03 = 100.12. The slight deficiency in the silica ratio suggests that about 1% HfO_2 may be present.

L. J. S.

LARSEN (Esper S.). *The optical properties of the humite group*. Amer. Min., 1928, vol. 13, pp. 354-359.

New optical data are given of the materials analysed by Penfield and Howe (1894) and by H. Sjögren (1882 and 1892). These and other values are tabulated with the several analyses of these minerals. No definite correlation can be made between the chemical composition and the optical data; there is overlapping of the optical data and these are further influenced by the presence of iron and titanium. The summary results are:

| | α . | β . | γ . | 2V. | Extinction. |
|--|-------------|-------------|-------------|--------|-------------|
| Norbergite, | | | | | |
| $\text{Mg}(\text{OH},\text{F})_2 \cdot \text{Mg}_2\text{SiO}_4$ | 1.561-1.563 | 1.566-1.570 | 1.587-1.590 | 45-50° | 0° |
| Chondrodite, | | | | | |
| $\text{Mg}(\text{OH},\text{F})_2 \cdot 2\text{Mg}_2\text{SiO}_4$ | 1.601-1.643 | 1.616-1.655 | 1.636-1.670 | 73-93 | 22-29° |
| Humite, | | | | | |
| $\text{Mg}(\text{OH},\text{F})_2 \cdot 3\text{Mg}_2\text{SiO}_4$ | 1.621-1.632 | 1.627-1.643 | 1.649- | 70- | 0 |
| Clinohumite, | | | | | |
| $\text{Mg}(\text{OH},\text{F})_2 \cdot 4\text{Mg}_2\text{SiO}_4$ | 1.623-1.664 | 1.636-1.673 | 1.651-1.698 | 62-90 | 7-15° |

L. J. S.

LARSEN (Esper S.), BAUER (L. H.), and BERMAN (H.). *Norbergite from Franklin, New Jersey*. Amer. Min., 1928, vol. 13, pp. 349-353, 1 fig.

Most of the specimens labelled in collections as chondrodite and

humite from the quarry in crystalline limestone at Franklin Furnace are norbergite [M.A. 3-273]. It consists of irregular grains around a nucleus of chondrodite. Analysis of tawny-coloured material gave SiO_2 28.63, Al_2O_3 3.12, FeO 0.73, MnO 0.04, MgO 59.42, F 12.78, H_2O 0.32, total (less O for F) 99.66, agreeing with the formula $\text{MgF}_2\text{Mg}_2\text{SiO}_4$; α 1.565, β 1.570, γ 1.591, $2V$ 49° , sp. gr. 3.20, H $5\frac{1}{2}$. Measurement of a single rough crystal shows it to be orthorhombic with $a:b:c = 1.10:1:1.897$, near to the values predicted by Penfield and Howe for a member of the humite group and incorrectly described as prolectite [M.A. 3-153].

L. J. S.

BAUER (L. H.) & BERMAN (Harry). *Friedelite, schallerite, and related minerals.* Amer. Min., 1928, vol. 13, pp. 341-348.

Some new chemical analyses and optical data are given for friedelite and schallerite [M.A. 2-419] from Franklin Furnace, New Jersey. These, together with pyrosmalite and molybdophyllite, belong to an isomorphous group of rhombohedral crystals with perfect basal cleavage and negative optical sign. The formulae deduced are: friedelite, $\text{Mn}_8[(\text{SiO}_3)_6(\text{OH},\text{Cl})_4] + 3\text{H}_2\text{O}$; schallerite, $\text{Mn}_8[(\text{SiO}_3)_6 \cdot (\text{OH})_{1.2}(\text{As}_2\text{O}_5)_{0.7}] + 3\text{H}_2\text{O}$ and $\text{Mn}_8[(\text{SiO}_3)_6 \cdot (\text{OH})_2(\text{As}_2\text{O}_5)_{0.5}] + 3\text{H}_2\text{O}$, the arsenic being present as As_2O_3 rather than As_2O_5 in the pyro-arsenious acid radical replacing hydroxyl and chlorine; pyrosmalite, $(\text{Fe},\text{Mn})_8[(\text{SiO}_3)_6(\text{OH},\text{Cl})_4] + 3\text{H}_2\text{O}$; molybdophyllite, $\text{Mg}_4\text{Pb}_4[(\text{SiO}_3)_4(\text{OH})_8] + \text{H}_2\text{O}$. Other minerals possibly belonging to the same group are bementite, hematolite, dixenite, macgovernite, parsettensite, and errite.

L. J. S.

PALACHE (Charles) & SHANNON (Earl V.). *Beryllonite and other phosphates from Newry, Maine.* Amer. Min., 1928, vol. 13, pp. 392-396.

The pegmatite veins recently worked for pollucite at Newry have yielded large (up to 8 cm.) tabular crystals of beryllonite which is in part altered to herderite; sp. gr. 2.806 (a re-determination of the sp. gr. of beryllonite from Stoneham, Maine, gave 2.798), β 1.558, γ 1.562; analysis I, agreeing closely with NaBePO_4 . The herderite forms radially fibrous botryoidal and spheroidal aggregates, a new habit for this mineral; sp. gr. 2.851, α 1.604, β 1.616, γ 1.627; analysis II, corresponding with $\text{Ca}(\text{OH})_2\text{BePO}_4$, shows more water than usual, perhaps because of the fibrous structure. Eosphorite was found as brown crystals and fan-shaped groups; sp. gr. 3.067,

α 1.638, β 1.660, γ 1.667; analysis III, agreeing with the usual formula $2\text{MnO} \cdot \text{Al}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$.

| | P_2O_5 . | Al_2O_3 . | BeO . | Fe_2O_3 . | MnO . | CaO . | MgO . | F . | H_2O . | insol. | Total. |
|------|--------------------------|---------------------------|----------------|---------------------------|----------------|----------------|----------------|--------------|------------------------|--------|--------|
| I. | 55.40 | 0.21 | 19.12 | 0.07 | — | 0.40 | trace | — | 0.52 | 0.16 | 100.15 |
| II. | 39.74 | 0.50 | 16.50 | — | 0.16 | 32.24 | 0.76 | 0.87 | 7.97 | 2.02 | 100.76 |
| III. | 30.38 | 20.51 | 0.27 | 0.56 | 27.65 | 0.84 | 0.36 | 0.18 | 15.59 | 0.45 | 100.53 |

I, also Na_2O 23.28, K_2O 0.92, Li_2O 0.07. III, also FeO 3.74.

L. J. S.

PALACHE (Charles). *Seligmannite from Bingham, Utah.* Amer. Min., 1928, vol. 13, pp. 402-405, 1 fig.

Seligmannite, CuPbAsS_3 , previously known only from Binn, Switzerland, has been found as small crystals with blende and tennantite on a pyrite specimen from Bingham, Utah. On six measured crystals 31 forms, including six new, are noted; $a:b:c = 0.9217:1:0.8718$, agreeing closely with R. H. Solly's (1903) value. Most of the crystals are twinned on $m(110)$. A table of calculated angles is given for the 80 known forms on seligmannite.

L. J. S.

PEACOCK (Martin A.). *The nature and origin of the amphibole-asbestos of South Africa.* Amer. Min., 1928, vol. 13, pp. 241-286, 3 pls.

A study of material in the Harvard University collection of (1) crocidolite from the Cape Province belt, and (2) long-fibred ash-grey amosite [M.A. 1-271] from the Lydenburg and Pietersburg belt, Transvaal. Both of these kinds of asbestos occur as cross-fibre seams along the bedding in banded siliceous ironstones (magnetite-quartzites) and ferruginous cherts, of which a description with new analyses is given. Analyses by H. E. Vassar are given of three types of crocidolite from Kliphuis near Prieska: I, usual type of finely fibrous blue material; II, powdery 'incipient' crocidolite; III, rarer acicular material with α 1.698, β 1.699, γ 1.706, $a:c = 0^\circ$, and pleochroism α and γ indigo, β yellow. These give the metasilicate formula $3\text{H}_2\text{O} \cdot 2\text{Na}_2\text{O} \cdot 6(\text{Fe},\text{Mg})\text{O} \cdot 2\text{Fe}_2\text{O}_3 \cdot 17\text{SiO}_2$ which is interpreted as a mixture of the molecules $\text{R}_2\text{O}_3 \cdot \text{RO} \cdot \text{SiO}_2$, $\text{R}_2\text{O}_3 \cdot \text{RO} \cdot 4\text{SiO}_2$, and $\text{RO} \cdot \text{SiO}_2$. Crocidolite is regarded as a fibrous form of riebeckite, and although the extinction of the fibres is straight it is perhaps monoclinic. New analyses by W. H. and F. Herdsman of amosite: IV, ash-grey from Penge, Transvaal, with $\frac{1}{2}(\alpha + \beta)$ 1.675, γ 1.702, $\gamma = c$; V, greenish-grey from Kalkfontein, Cape Province, with $\frac{1}{2}(\alpha + \beta)$ 1.663, γ 1.680, $\gamma = c$. This composition is expressed by the above three molecules, and amosite is regarded as a distinct

species of orthorhombic amphibole intermediate between ferroanthophyllite and gedrite. It is suggested that the ironstones were chemical precipitates from submarine fumaroles, and that the crocidolite was formed by later metamorphic processes along the soda-rich bedding planes.

| | SiO ₂ . | Al ₂ O ₃ . | Fe ₂ O ₃ . | FeO. | MgO. | CaO. | Na ₂ O. | K ₂ O. | H ₂ O+. | H ₂ O-. | Total. |
|------|--------------------|----------------------------------|----------------------------------|-------|------|-------|--------------------|-------------------|--------------------|--------------------|--------|
| I. | 51.94 | 0.20 | 18.64 | 19.39 | 1.37 | 0.19 | 6.07 | 0.04 | 2.58 | 0.31 | 100.73 |
| II. | 50.71 | 0.00 | 20.45 | 17.41 | 2.28 | 0.15 | 5.75 | 0.07 | 2.50 | 0.96 | 100.28 |
| III. | 50.66 | 0.04 | 22.64 | 17.05 | 1.99 | 0.01 | 5.15 | 0.09 | 2.62 | 0.15 | 100.40 |
| IV. | 47.35 | 4.20 | 3.34 | 36.60 | 5.80 | 0.77 | trace | trace | 1.25 | 0.35 | 100.03 |
| V. | 47.04 | 7.02 | 2.43 | 26.10 | 4.96 | 10.84 | trace | trace | 1.05 | 0.45 | 100.19 |

IV, also TiO₂ trace, MnO 0.28, P₂O₅ 0.04, S 0.05, CO₂ trace.

V, also TiO₂ trace, MnO 0.15, P₂O₅ trace, S 0.05, CO₂ 0.10.

L. J. S.

JOURDAN (C. J. N.). *Note on the chemical composition of crocidolite or Cape blue asbestos.* Journ. Chem. Metall. Mining Soc. South Africa, 1927, vol. 27, pp. 287-289.

The following analyses by J. McCrae are given of finely fibrous silky crocidolite from various farms at: I, Kuruman, Bechuanaland, dark blue; II, Kuruman, light blue; III, Pietersburg, Transvaal, light blue; IV, Kuruman, dark blue; V, Prieska, Cape Province, dark blue; VI, Kuruman, light blue; VII, Prieska, dark blue; VIII, Hay, Griqualand West, dark blue. The colour ranges from dark lavender-blue to almost French-grey, but the spinning properties of the fibre are not influenced by the variations in chemical composition. All the samples fuse easily to a black mass.

| | SiO ₂ . | Al ₂ O ₃ . | Fe ₂ O ₃ . | FeO. | MgO. | CaO. | Na ₂ O. | (+100°). | (-100°). | H ₂ O | H ₂ O |
|-------|--------------------|----------------------------------|----------------------------------|-------|------|------|--------------------|----------|----------|------------------|------------------|
| I. | 52.30 | — | 17.50 | 17.30 | 4.25 | 0.80 | 4.55 | 3.00 | 0.80 | 100.50 | |
| II. | 54.50 | — | 21.00 | 13.10 | 2.85 | 0.90 | 4.05 | 2.90 | 1.05 | 100.35 | |
| III. | 59.40 | — | 14.40 | 15.10 | 3.40 | 0.55 | 4.05 | 3.25 | 0.10 | 100.25 | |
| IV. | 52.90 | — | 17.10 | 16.40 | 4.55 | 0.65 | 3.90 | 3.90 | 0.45 | 99.85 | |
| V. | 52.60 | — | 17.75 | 18.70 | 2.30 | 0.85 | 4.40 | 3.20 | 0.30 | 100.10 | |
| VI. | 50.50 | — | 20.20 | 15.40 | 3.65 | 0.80 | 4.40 | 4.15 | 1.05 | 100.15 | |
| VII. | 50.65 | — | 18.55 | 17.85 | 2.30 | 0.75 | 5.70 | 3.70 | 0.80 | 100.30 | |
| VIII. | 52.85 | 2.00 | 17.10 | 18.00 | 1.75 | 0.85 | 4.90 | 2.55 | 0.70 | 100.70 | |

L. J. S.

SCHALLER (Waldemar T.). *Hydroboracite from California.* Festschrift Victor Goldschmidt, Heidelberg, 1928, pp. 256-262, 1 fig.

Hydroboracite, previously known only from the Caucasus and reported doubtfully from Stassfurt, Germany, has been found as

radiating fibrous or columnar masses on colemanite near Ryan, Inyo Co., California. The colourless crystals are bladed parallel to (010) with $a:b:c = 1.7649:1:1.2330$, $\beta = 77^\circ 21'$, and the forms b (010), a (100), c (001), l (130), h (120), m (110), k (310), n (410), j (810), e (011), v (012), d (102), p (111), r (112), s (343), t ($\bar{2}11$). The optic axial plane is (010), $a:c = 33^\circ$, 2E large, positive, a 1.522, β 1.534, γ 1.569. Sp. gr. 2.167. Analysis, B_2O_3 47.71, CaO 14.06, MgO 10.14, Fe_2O_3 0.12, SiO_2 0.23, CO_2 trace, H_2O 27.37 = 99.63, agrees with the usual formula $CaO.MgO.3B_2O_3.6H_2O$. L. J. S.

WALKER (T. L.) & PARSONS (A. L.). *Beryl and associated minerals from Lyndoch township, Renfrew county, Ontario.* Univ. Toronto Studies, Geol. Ser., 1927, no. 24, pp. 12-14, 1 fig.

Large crystals (up to $19\frac{1}{2} \times 4\frac{1}{2}$ inches) of beryl occur in pegmatite with green microcline-perthite, albite, white and pale-rose quartz, garnet, black tourmaline, columbite [M.A. 2-237], and magnetite. They show the forms $m s p c$ [Dana's letters], and in portions are of gem-quality aquamarine. Analysis by H. C. Rickaby gave SiO_2 64.40, Al_2O_3 18.08, Fe_2O_3 0.97, BeO 14.38, MnO 0.04, MgO 0.33, CaO 0.18, Na_2O 0.35, K_2O 0.18, Li_2O 0.18, H_2O 1.08, total 100.17, sp. gr. 2.726, agreeing with Penfield's formula $(R_2R)O.6BeO.2Al_2O_3.12SiO_2$.

L. J. S.

CARMICHAEL (Ferga). *Catalytic action in the oxidation of sulphides and arsenides.* Univ. Toronto Studies, 1927, no. 24, pp. 47-53, 2 figs.

Experiments were made on the same lines as previously [M.A. 3-304], but in the presence of small amounts of platinum-black, pyrite, or manganese dioxide. In the case of chalcosine and pyrrhotine there was no appreciable difference. With polydymite the oxidation was accelerated in the presence of platinum-black and retarded by pyrite and MnO_2 . Rammelsbergite showed marked increases in the rate of oxidation, this being greatest in the presence of platinum-black and least with pyrite.

L. J. S.

THOMSON (Ellis). *A mineralographic examination of cohenite from Ovifak, Greenland.* Univ. Toronto Studies, Geol. Ser., 1927, no. 24, pp. 41-43, pl. 3, fig. 2.

Microscopical examination of polished and etched sections of a specimen of 'cohenite' from the terrestrial iron of Ovifak appears to

show that it consists of a mixture of cohenite [= cementite, Fe_3C], native iron, and troilite [FeS]. An analysis, however, gives Fe 78.12, S 16.40, insol. 3.86 = 98.38, corresponding roughly to Fe_3S , 'instead of Fe_3C '.

L. J. S.

THOMSON (Ellis). *Canadian localities for chalmersite*. Univ. Toronto Studies, Geol. Ser., 1927, no. 24, pp. 44-46, pl. 2, figs. 1-3.

Chalmersite [= cubanite, M.A. 2-235-6, 3-401] was detected by the microscopical examination of polished ore specimens from Cold Lake, northern Manitoba, and Raglan township, Renfrew Co., Ontario. It forms slender needles embedded in chalcopyrite and arranged parallel to the parting-planes of the latter, or as granular masses with chalcopyrite; in the latter case having much the appearance of pyrrhotite in hand-specimens.

L. J. S.

ELLSWORTH (H. V.). *Euxenite from Sabine township, Nipissing district, Ontario*. Amer. Min., 1928, vol. 13, pp. 484-487, 1 fig.

Bunches of crystals from pegmatite consist of much fissured optically isotropic material, sp. gr. 5.002. Analysis gave Nb_2O_5 28.62, Ta_2O_5 2.65, TiO_2 22.96, SiO_2 0.09, ZrO_2 0.05, SnO_2 0.07, UO_2 8.61, UO_3 0.20, ThO_2 3.94, $(\text{Ce},\text{La},\text{Di})_2\text{O}_3$ 0.44, $(\text{Yt},\text{Er})_2\text{O}_3$ 24.31, PbO 1.35, $\text{Al}_2\text{O}_3 + \text{BeO}$ 0.26, Fe_2O_3 2.07, MnO 0.28, MgO 0.03, CaO 1.92, Na_2O 0.17, K_2O 0.04, $\text{H}_2\text{O} (-110^\circ)$ 0.08, $\text{H}_2\text{O} (+110^\circ)$ 2.15.

L. J. S.

ROGERS (Austin F.). *Natural history of the silica minerals*. (Presidential address.) Amer. Min., 1928, vol. 13, pp. 73-92, 20 figs.

A general review of the several forms of silica and of their modes of occurrence and transformations, illustrated mainly by Californian examples. Tridymite appears to be of metamorphic, rather than of magmatic, origin. A rhyolitic obsidian on Cormorant Island, Salton Sea, California, shows gradations into spherulitic obsidian, dense devitrified obsidian (cristobalite-barbierite-rock), and porous tridymite-barbierite-rock, the final change being evidently due to the action of hot gases. Cristobalite is a characteristic mineral of spherulites and is of more frequent occurrence than usually supposed. Paramorphs of cristobalite after tridymite are mentioned. Lechatelierite (silica-glass) occurs as a fused sandstone in the rim of Meteor Crater, Arizona, the high temperature being no doubt due to the impact of the meteorite.

L. J. S.

MACCARTHY (Gerald R.). *An unusual quartz crystal from Grassy Creek, N.C.* Zeits. Krist., 1928, vol. 67, pp. 29-32, 2 figs.

A small crystal (*mrzs*) of quartz from North Carolina shows parallel growth and twinning, and is remarkable in bearing a negative right trapezohedron ($\bar{2}.13.\bar{1}\bar{1}.2$) on a left-handed individual on which there are no other trapezohedral faces.

L. J. S.

LONSDALE (John T.). *Analcite from Brewster County, Texas.* Amer. Min., 1928, vol. 13, pp. 449-450.

Crystals of analcime in altered basalt from the old mercury mines at Terlingua are birefringent with division into sectors which sometimes show an indistinct biaxial interference-figure: $n 1.484$. Analysis gave SiO_2 56.53, Al_2O_3 21.61, MgO 0.18, CaO 0.81, Na_2O 9.95, K_2O 2.20, $\text{H}_2\text{O} +$ 0.58, $\text{H}_2\text{O} -$ 8.15, insol. 1.51, total 101.52. L. J. S.

VAN HORN (Frank R.). *Large magnetite and franklinite crystals from Franklin Furnace, New Jersey.* Amer. Min., 1928, vol. 13, pp. 171-173, 2 figs.

A crystal (*do*) of magnetite measuring $10 \times 9 \times 9$ cm. and weighing 1205 grams is mentioned, also franklinite crystals (*od*) up to 10 cm. across.

L. J. S.

FAIRBANKS (Ernest E.). *The importance of pollucite.* Amer. Min., 1928, vol. 13, pp. 21-25.

Caesium is used in thermionic valves and as a micro-chemical reagent, and pollucite (Cs_2O 34 %) is its more important source. It has been produced from quarries in pegmatite at Andover and other localities in Maine. In general appearance pollucite is very similar to quartz, and perhaps in some other pegmatites it has been mistaken for quartz. Other caesium-bearing minerals are caesium-beryl, rhodizite, and lepidolite; and the last, when mined also for lithia, may come to be of importance as a source of caesium.

L. J. S.

BILLIET (Valère). *Over calcietkristallen van Vodelée.* Natuurwetensch. Tijdschrift, Antwerpen, 1928, vol. 10, pp. 158-159, 1 fig. [Flemish with French résumé.]

Calcite crystals from the marble quarries at Vodelée show the forms (10 $\bar{1}\bar{1}$), (4041), (7.2.9.11), (7186), the last not previously recorded from Belgium.

L. J. S.